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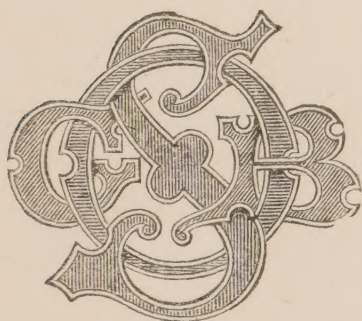
OF THE

Odontological Society of Great Britain.



VOL. VIII.—NEW SERIES.

TRANSACTIONS
OF THE
ODONTOLOGICAL SOCIETY
OF
GREAT BRITAIN.



VOLUME VIII. — NEW SERIES.

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GENERAL MONTHLY MEETING.

November 1, 1875.

JOHN TOMES, Esq., F.R.S., PRESIDENT, IN THE CHAIR.

THE Minutes of the last Meeting having been read and confirmed,

The following gentlemen were elected as resident members of the Society :—

Mr. JOHN ALEXANDER GARTLEY, 5, Sackville-street, W.

Mr. JOHN H. HATFIELD, L.D.S., 25, Old Burlington-street, W.

The following gentleman was elected as a non-resident member :—

Mr. MAURICE D. WOOD, Whitehall-place, Stockton-on-Tees.

The following gentlemen were proposed as resident members :—

Mr. ALEXANDER CARTWRIGHT, M.R.C.S., L.D.S., 32, Old Burlington-street, W.

Mr. THOMAS GADDES, 169, Prince of Wales-road, N.W.

Mr. DAVID HEPBURN, L.D.S., 9, Portland-place, W.

And as non-resident members :—

Mr. ROBERT HOPKINSON, 32, Broughton-road, Salford.

Mr. THOMAS MARK KELLY, 94, Oxford-street, Manchester.

Mr. EVELYN PIERREPOINT, 359, Oxford-street, Manchester.

Mr. EDWARD NORMAN WASHBOURN, L.D.S., Mount Pleasant, Tunbridge Wells.

Mr. SIDNEY WORMALD, Stockport.

Mr. THOMAS WORMALD, 188, Union-street, Oldham.

The following gentleman signed the obligation book :—

Mr. HENRY JOHN HOOPER, Clifton Villa, Eltham-road, Lee, S.E.

Mr. C. S. TOMES, the Curator, announced the following donations to the Museum :—

By Mr. PETTY, of Reading :—

A stuffed rabbit, showing irregular growth of upper incisors owing to non-contact with the lower incisors, which had been injured by a shot.

By Mr. FOTHERGILL, of Darlington :—

Models, showing an instructive case of irregularity, before and after treatment, with the apparatus used. The case was completed in five months.

Mr. Fothergill's donation to the Museum was in accordance with a request from the Curator that good specimens of such cases should be sent.

By Mr. JAMES BATE, of Tiverton :—

The skull of an otter.

By Mr. DUNCAN HEPBURN, of Nottingham :—

Two malformed teeth which took the place of the lower bicuspids.

By Mr. VANDERPANT, of Kingston :—

A curious foetal calf. The foetus was very small, by no means developed to the point to which it should have been, although the cow had gone the full time of pregnancy, and when that had elapsed, showed the usual signs of labour ; but the foetus was brought away by the veterinary surgeon from outside the uterus, where it was lying enveloped in membrane. The uterus was firmly closed, as if the foetus had passed out of the uterus some time before.

The PRESIDENT said, that Mr. Sewill and Mr. Turner, whose papers were announced, wished to give way to Mr. Kirby, who had come up from the country, and whom he would now call upon to exhibit his Pneumatic Mallet.

Mr. KIRBY then read the following account of his new mallet.

MR. PRESIDENT AND GENTLEMEN,

THE success which has attended the use of foot-power for excavating and preparing teeth for stopping and other purposes has naturally suggested the idea that it might be useful for giving motion to a mallet for packing and consolidating the stopping, and instruments have been designed

for this purpose. Those which I have seen are, however, rather too heavy to be used comfortably, and require some special manipulation to produce the varying degree of force which may be desired in working with them. The blows, too, are given at regular intervals instead of each being produced at the moment it is wanted.

It had occurred to me, some years ago, that air might be used as a source or conveyer of the motive power acquired for such purposes, but as I possessed instruments answering most of my requirements the subject was not pursued ; it has, however, lately been brought under notice again, and an instrument has been made which has proved so satisfactory that I have ventured to bring it before the Society this evening, and as I think it is not unlikely to prove very useful to those who employ mallet-power in their operations, I have placed the model in the hands of Mr. Ash, who I am sure will produce an apparatus which will be satisfactory as far as the maker's art is concerned.

The instrument consists of a light metal tube provided at one end with a socket for holding the point, and containing a loose piston or plunger, which is moved rapidly forward by a puff of air obtained from a small bellows connected with it by India-rubber tubing, and worked by the foot. In addition to the straight instrument, which

like all others can only transmit force in a straight line, I have contrived one in which the point stands at an angle to the shaft by which the direction of the blow is changed, and by its help a stopping can be consolidated towards the anterior or exterior walls of distal cavities.

From the light weight and high rate of speed at which the hammer travels, a very small blow is given, the force of which is almost entirely expended on the immediate neighbourhood of the spot struck, so that there is very little unpleasant battering or shaking of the tooth, as is the case when a heavy mallet is used, whilst the blow is very much more effective.

In experimenting with different methods of introducing gold, I was surprised to find that such unadhesive foil as Ash's neutralized could be welded together without difficulty, so that stoppings could be built up which were free from some of the defects incident to the use of annealed gold, and I have succeeded in so forming some in the mouth.

A very small movement of the foot is necessary to produce the blows, which vary at pleasure with the amount of force used.

The PRESIDENT said he thought this Mallet of Mr. Kirby's was, so far as he could see, the best that had come under his observation, being so effective, although so simple. The automatic mallets he had hitherto seen were somewhat too heavy to

use. If any gentlemen present had had the opportunity of using Mr. Kirby's instrument before this evening they would be glad to hear their remarks upon it; but without such previous practical experience it would be difficult to give an opinion upon so new an instrument.

No one responding,—

The PRESIDENT then called for the next communication :—

On Amalgams. By MR. KIRBY.

MR. PRESIDENT AND GENTLEMEN,

WHEN I proposed to do myself the pleasure of attending this meeting, I did not intend to say anything on the subject of amalgams, but as my opportunities of being here are not frequent, I will ask permission to trespass on your time for a very few minutes.

After experimenting some two or three years ago with the view to determine what expansion or contraction took place in these substances, I arrived at the conclusion that, however desirable it was to obtain the former tendency, another property—that of changing its shape after hardening—had far more to do with the failures incident to their use. My object in rising is again to urge that the correct explanation of this tendency is, without doubt, the one given in the new

edition of Mr. Tomes's manual, viz., that the excess of mercury which is usually squeezed on to the surface in packing is, after a time, absorbed into the dryer part at the bottom of the cavity, which then expands, whilst the surface portion, which parts with it, contracts in consequence, giving rise to the cupped shape so often noticed. It appears, at first sight, not a little remarkable that the specimens of stopping in large short tubes or cups which we have so frequently seen and heard of lately can easily be made waterproof; but, from a little consideration of the way in which these test stoppings are made, it is quite evident that the mercury is not only squeezed out from the stopping at the bottom of the tubes, but also from that round the sides of the orifice, which part will necessarily expand when it again absorbs the surplus mercury from the centre, so that the contraction is confined to that part of the cup where its effect is not seen.

It has been suggested by Mr. Sewill that, as stopping adheres to the side of a rough mortar, in consequence of the rubbing it receives, it may be made to adhere to the side of a dry tube or tooth in the same way. I think, however, that although this is the case with a small bit of amalgam, the same will not occur with a larger piece, which touches and may adhere to both sides of a

tube, for the attraction which holds it to the sides will be far less than that which holds it together in a mass; so that, if contraction takes place, the stopping will leave the side rather than itself break into two parts.

There are two substances, the amalgams of which expand so greatly that the defect due to change of shape is entirely counterbalanced,—*silver*, which is far the best stopping in the hands of amateurs, as I have often seen from the mouths of residents in India, who have stopped their own teeth with filings made from coin; and *palladium*, which is not the least successful substance in the hands of those dentists who have used it. I may here mention that a mass of palladium amalgam (which is most easily made by putting into a mortar the required quantity of palladium with twice its weight of mercury) was introduced into a trough for measuring; and after expanding very greatly, it changed form considerably, assuming the usual bow shape, but afterwards returning to its original outline, which it still retains. On viewing the various methods in which ordinary amalgams have been used successfully, it appears to me that more or less satisfactory results may be obtained in two or three ways. Amalgams introduced in the *rougher* manner often preserve teeth for a long time, which is no doubt due to the mercury

not having been displaced by careful packing, so that there is no change of shape from this cause. Next come the amalgams which have been packed in the *dryest* condition—so dry that no mercury can be squeezed on to the surface: these are not so suitable for the class of cavities in which amalgams are used as a softer paste, although if dry enough they may be made to keep their shape. Lastly, those in which the first portion of mercury is used rather soft, and the last very much dryer, so that it absorbs the surplus squeezed out of the first part. These are easy to use, and, being free from any great change, are the most useful in practice. I have been able to make stoppings in this way which, instead of forming a cup-shaped surface after setting, became convex, thus showing expansion at the orifice instead of contraction. I mix equal weights of filings and mercury, then divide the mass in half, and add to one part filings equal to half the original weight used. The soft mass is used to line the cavity, and the dry for the surface.

The plan of using a moderately dry amalgam or any other form short of excessive dryness, without taking the greatest care to make the surface still dryer, is pre-eminently unsatisfactory.

I have brought with me this evening a small weighing-apparatus, on the steelyard principle, which, having the pan very accessible, and only

requiring two weights, is convenient, and saves time in mixing the stopping.

I should like to take this opportunity to notice a statement which was made in this room at a late meeting in reference to an alloy I had mentioned here as being, at all events, free from contraction ; it was to the effect that “ whilst it happened to show a trace of expansion, it had some odd ‘trick’ which made it inferior to some other.” I feel bound to say it has never shown *me* any tricks or antics, which may have arisen from the mode in which it was used, or my freedom from them may be due to my preference for dry cavities. In practice I find its properties of hardening rapidly and keeping its colour well are very useful.

DISCUSSION.

In reply to a question from the President,

Mr. KIRBY said the amalgams alluded to by him contained a larger quantity of silver than those generally used. He had not the formulas with him, but would forward them. One of them was somewhat like what Mr. Tomes had published many years ago, differing from it mainly in containing the silver and tin in nearly chemical proportions. These amalgams expanded more than those in ordinary use. Another, the formula of which was published by Dr. Roberts—like most of those containing a large quantity of silver—gave similar results. The formula was published in the “Transactions,” and in the *British Journal of Dental Science*. A pretty good quantity of gold seemed to be needed to produce rapid setting and prevent discoloration. The main fact to which he wished to draw attention was, that amalgams containing the metals in nearly their combining or chronic proportions, though it was not at all clear that they combined chemically, seemed to act more satisfactorily than those in which they were mixed without any relation.

Mr. KIRBY then showed specimens in illustration of his assertion, that it was desirable to have the excess of filings at the top, and the excess of mercury in the bottom of a filling.

Mr. VASEY inquired if Mr. Kirby, during his experiments with these amalgam stoppings, in packing them tightly and bringing the more fluid portion to the surface, considered that it was only the mercury that came to the surface, or tin and mercury combined.

Mr. KIRBY said he had not separated the portion that came to the surface, because he thought it mattered very little indeed what it was ; but, unless thoroughly dried, a very bad stopping resulted. Practically, it was of very little consequence whether

it was the tin by itself in the mercury, or the whole amalgam dissolved in the mercury, that came up.

Mr. C. S. TOMES said, he should not like Mr. Kirby to go away without some few words being said on the subject he had brought under their notice, the more so as others had attempted to discredit Mr. Kirby's results. The question of the failing of amalgams seemed to depend on two things—the one on the change of form, and the other on the change of bulk. Mr. Kirby had brought prominently forward by his experiments the change of form aspect of the question; whilst he Mr. Tomes, had some little time back brought forward that of change of bulk, and which of these two factors played the greatest part in the failure of an ordinary amalgam filling was not yet known. Of course, they would like to get an amalgam which did neither the one thing nor the other. Mr. Fletcher had adopted one manner of experimentation, namely, packing amalgams into tubes, in preference to testing by packing them into teeth, which were the things in which they would like to see them tried, and convinces them, by a number of fillings packed into tubes, that it was possible to make watertight fillings *in a tube*, and they, it seemed, might be made of the very worst of amalgams as well as of the best, by appropriate manipulation. Therefore it seemed to him that that matter of packing amalgams into tubes as a test should be put aside once and for all. Mr. Fletcher's own admission that a watertight filling could be made in a tube with a bad amalgam was fatal to its efficacy as a test, for it was a fallacious result which gave an appearance of success, when no such success was met with in a tooth. If they were to try amalgams in the direction of making a watertight filling, by all means put them into such places as those in which they were going to use them, namely, cavities of irregular form and shape, in which the walls occurred in all sorts of positions in relation to the whole mass. Their thanks were very much due to Mr. Kirby for bringing prominently before them the other aspect of the question, namely, the change of form, because if an amalgam was capable of retaining the

same specific gravity from the time it was fluid to the time it was solid,—that was to say, if it underwent no change of bulk, yet if it was going to change form—and Mr. Kirby had shown that many amalgams did go on changing form (Mr. KIRBY : All)—if all amalgams did go on changing forms for days or months, they could not succeed in making perfect fillings, unless they could find some manner of handling which would get over that trouble ; and Mr. Kirby seemed to be on the road towards finding such a method by so adjusting the fluidity of the different parts of the filling as to compensate, as far as possible, that change of form which would otherwise occur.

Mr. SEWILL thought that, looked at from a purely scientific point of view, it was, no doubt, rarely justifiable to use any material for filling teeth but gold, there being few cavities in which a gold filling could not be put. But, practically, they were obliged to use other materials, as, for instance, in hospitals, on account of expense. Besides, the labour of making gold fillings was so great in all but the smallest cavities, that gold must be unattainable by the poorer classes. Hence, those who worked at amalgam fillings in a scientific spirit were doing some of the best work for the profession. He was glad to hear Sir James Paget, with his usual acumen, notice the imperfection of their knowledge on amalgams, and urge those who were working at scientific improvements in dentistry to direct their attention to that subject. As secretary of the Society, he (Mr. Sewill), when asked what gentlemen should work at, and what information would be acceptable to the Society, had recommended them to work at amalgams, being quite certain that if they produced some results based on scientific evidence, they would do great good to the profession. Of late years he had been using Sullivan's cement very extensively, especially in hospital practice, and had come to the conclusion that, if used with proper care, it was very little less durable as a filling than gold. He made that statement very deliberately, not forgetting the disadvantages which attached to Sullivan's cement. Although on scientific grounds inferior to gold, prac-

tically it was an admirable filling, and although he used it chiefly in the back of the mouth, he did not hesitate to use it in the front, where the teeth were already much discoloured. As a filling it was extremely durable ; its durability depending, no doubt, on the small amount of contraction which took place, which, according to Mr. Tomes's experiments, showed it to be next to palladium, and the durability was further dependent upon the particular action which it had on the subjacent dentine. Some amalgams occasionally, by accident, stained the dentine, and rendered the surface against which they rested very hard ; but that change almost invariably took place with Sullivan's cement. It was about the only amalgam which appeared to do for an interstitial cavity. A cavity between bicuspidis filled with Sullivan's cement would last, if properly done, in a number of cases, but no other amalgam with which he was acquainted would last except as a temporary expedient in those positions. Amalgams should be used with great care. They were too often used as a last resource, and only carelessly packed. A cavity ought to be prepared as well for an amalgam as for a gold filling, with retaining points and undercuts. An amalgam did not adhere to the surface of the tooth, it was only held as a plug, and the cavity must be so shaped that the filling should be retained by packing and not by adhesion.

The PRESIDENT then called upon Mr. Fox, who proceeded to point out some improvements made by Mr. Owen in the dental chair invented by him, and known by his name.

The chair, which was exhibited by Messrs. Ash, showed but little external difference to those originally made, but had added to it a movement, by which the patient could be easily placed in a reclining position, and yet, by the easy action of a screw, the whole chair with the patient in it could be raised to any required position, without any alteration whatever in the level of the head.

The PRESIDENT then called upon Mr. Hutchinson for the paper of the evening.

The Dental Nerve-pulp in Life and in Death.

By MR. HUTCHINSON.

MR. PRESIDENT AND GENTLEMEN,

HAVING received the honour of a request to write a paper, for the opening meeting of the present term, and being told I must be brief, I have chosen a subject hackneyed enough, but of surpassing interest.

At the outset therefore I would crave your indulgence for the shortcomings I am too conscious my paper possesses, and ask you to hear patiently when I may tread on beaten ground, my object being rather to review than to state much that is new, and this generally, rather than in detail, to save time.

There are so many different methods of treatment, so hopeless a mass of literature to consult, that it is not possible in a short paper to deal with them all, or to quote authorities; and on these many methods, opinions are so divided, that to call forth the expression of these to-night is my chief object in selecting this subject.

After these few words of preface, one would premise that fully nine-tenths of our surgical practice, apart from mechanical work, involves some treatment either directly or indirectly of

the dental-pulp. *Indirectly*, of course, even in simple cases of stopping where the “*nerve*” so-called is not exposed, but the dentine, through its influence, we must allow, is more or less sensitive. *Directly*, treatment of the nerve in its exposure and its death, or the results in alveolar abscess, gives more anxiety and trouble to patient and operator than any other branch of our calling, save and except the treatment of cleft palate.

The minute anatomy and physiology I will dismiss untouched upon, in these happy days of complete instruction and readily accessible literature, passing at once to the pathology and surgery, dealing with the subject under various heads.

1. Sensitive dentine.
2. Nerve near and tender.
3. Nerve exposed in excavation.
4. Nerve exposed by disease.
5. Inflamed nerve.
6. Suppuration and sphacelus.
7. Alveolar abscess, acute and chronic.

Sensitive dentine, except in certain situations, does not deserve the importance frequently attached to it by writers on this subject, and I am prepared to hold that there is very seldom need to resort to remedial means for its relief temporarily, except by two methods. One is to prepare the cavity until healthy bone is reached,

always the most sensitive, and then, sooner than continue the torture, it is best to stop with an osteo-plastic material, enjoining the patient to return in three months. In other cases where the cavity is on the buccal surface of a molar near the neck, a certain means of relief of the exquisite tenderness is to apply arsenic and carbolic acid to the cavity on blotting-paper, sealing it with wax.* It is of the last importance not to use it for more than thirty-six hours, or if the nerve is near, or death of this will follow; and, as far as my experience goes at present, the use of arsenic is to be deprecated as much as possible.

The removal of horny masses of disorganized dentine in large cavities, is often agonizing, and may be made easier for the moment, by applying pure carbolic acid, though a sharp excavator will do the work effectually without.

There is a large class of cases which give one endless trouble, where, allied with extensive decay, sensitive dentine, and inaccessible cavities, there is a condition amounting almost, but not quite, to exposure of the nerve. This is the case more especially, in the bicuspid, and injudicious treatment would lead to certain loss of the

* See Tomes's "Dental Surgery," pp. 326-536. Two medical friends working for the M.D. of London, an exhausting and exhaustive examination, had very sensitive dentine without odontalgia, both wonderfully relieved by 3 grains of quinine t. d. s.

tooth, or at least to an uncomfortable condition of chronic abscess.

It is, therefore, better to pursue a guarded method of treatment, and be contented to delay gold-stopping, preferring to use gutta-percha, taking care to spread a small piece of lead over the situation of the nerve; a simple plan which distributes the pressure of the stopping equally, instead of letting it be forced unduly on the thin layer of dentine protecting the nerve.

A word or two here as to the method of inserting gutta-percha in such cavities. After sponging out the cavity with chloroform, take a larger piece than will fill the cavity, using a thick instrument, heating it an inch from the end, and it will retain enough heat to soften, and insert the stopping, with once passing over the flame. Now dip it into chloroform, by which means the surface is cooled and rendered sticky, so as to adhere to the cavity more thoroughly than in any other way.

The question of exposure of the pulp now comes before us, and this I consider the most important part of my paper, as I shall here have the opportunity of stating publicly a method of treatment adopted, and shown to me, by my late kind and lamented friend, Mr. Sercombe. I know it was his intention to bring this matter before the Society, after three years' constant experience of it, and although some here

may know the plan, I have great pleasure in making it more widely known, on account of the happy results it has afforded me, as well as the many successful cases I have seen treated by our late President.

It is well known that the most successful cases of capping the pulp are those done over exposure during excavation, one element of success being the previous absence of pain. By this is meant idiopathic toothache, apart from traumatic that is, only brought on by exciting causes, this being far less preventive of successful stopping than when the pain is constant or worse at night.

Therefore, taking a case of exposure during excavation, whether before subject to traumatic pain or no, one must be careful not to wound the exposed pulp, though bleeding from it is not fatal to success. Mr. Sercombe's plan was to cut a small piece of pattern lead the size of the floor of the cavity, and on it to place some morphia, moistening it with creosote. He always mixed them on the lead, but I keep the paste ready made. He used the lead flat, but I burnish it into a saucer shape, in the middle very shallow; then, with rubber-dam in place, apply the lead with the paste over the exposed nerve; then with osteo mixed soft proceed to fill the cavity, the pressure of the instrument communicated through the stopping serving to send the lead home all over

the floor of the cavity. Thus, the object of having the lead saucer-shaped is to allow of the force being spent on the lead, and not on the nerve. After the stopping is in, it may be varnished either with melted wax or solution of gum.

It is wise to request to see the stopping in from three to six months, when it may want renewing, or the tooth may bear a harder stopping. Still I have seen cases treated this way quite satisfactory after eighteen months to two years.

I admit that this class of cases is easily treated in various other ways successfully,* but not so painlessly, and it is invaluable in cases of irritated pulps, as will be shown presently. The osteo I prefer, as giving least pain, is that prepared by Gutensohn, which I have used for a year satisfactorily, the free acid in the chloride being neutralized with magnesia.

This plan of capping exposed nerves is capable of modification, whereby a tooth can be stopped permanently at one sitting, provided the pulp be healthy. This is to proceed as described with the lead and morphia, but, instead of filling up the cavity with osteo, let it only be placed in one mass sufficient to cover the lead all over, adhering to the walls of the cavity all round, leaving,

* A very exhaustive paper on this subject by Mr. T. A. Rogers is published in the "Transactions" of this Society.

however, sufficient space and holding ground for a metallic filling. And here is a suitable case for amalgam, preferably palladium, which can be inserted so gently as not to press on the delicate pulp through its protecting layer of osteo, for gold would to a certainty set up mischief.

In dealing with the question of exposed pulp after inflammatory pain, I confess the difficulty of my subject, and on this I would here ask for a full expression of opinion of the members present as to the safest method of treatment, although no hard and fast rule can be laid down, except to condemn as much as possible the use of arsenic as an escharotic.

At the first visit one would remove some of the decay, if not too painful, applying one of the usual dressings, aconite and chloroform, carbolate of collodion, or the paste of creosote and morphia, for some days until all pain had gone, painting the gums with aconite and iodine.

Finally, removing all decay, proceed to fill in exactly the same way as before, with lead, creosote, and morphia, and osteo over. Speaking generally, eighty per cent. of cases so treated are successful, and those not so end peacefully usually, the nerve dying in many cases without pain, or only gradually, and when the stopping is removed no sensitiveness remains, and the tooth is ready to be treated in a manner to be described.

I am aware here that I have not referred to Mr. Oakley Coles's ingenious method of using pepsin, but I hope to hear his further experience; nor have I alluded to lacto-phosphate of lime, for on that point also my experience does not allow me to enter fully: therefore, I trust to hear of it from others.

When the exposed surface of the pulp is in a diseased state and suppurating, and should one of the many social causes, such as a passing visit from the patient from a distance, demand instant treatment, another plan may be adopted.

An old tube tooth is broken in the vice, and its platinum tube soldered flush into a scrap of thin gold or platinum foil; this is then to be fitted over the exposed pulp, its edges resting on the hard tissue around. This plan, mentioned by our President at the last meeting, is only applied to dead teeth.

The tube must be over the pulp, and the opening kept patent by a piece of pinwire, until the stopping of osteo or amalgam be completed. A vent is thus left for the discharge from the pulp, and even should sphacelus ensue, as is probable, no abscess is likely to form at the root, owing to the free exit through the tube. It may be urged that the opening gets closed by food, but this did not occur in the cases I have seen: certainly not numerous.

The last class, almost the most troublesome, certainly very uncertain and doubtful for treatment, consists in complete death of the pulp, either recent or of old standing, whether under a filling or not.

The orthodox treatment is, of course, shortly described; to clean out fangs completely, put cotton and creosote or carbolic acid up each, and change dressing till sure of no discharge. This implies a course of treatment varying from a week to I know not how long; the result, frequently success, at cost of endless patience on both sides; and if failure, a miserable one certainly, with swollen face, alveolar abscess, &c.

Take for instance the sort of tooth often seen where the pulp is dead: still one finds in passing a barbed instrument, that pain is given in the disorganized remains of nerve fibrils. These must be removed as much as possible, and then the old operation* of Hullihen in America, Henry Long Jacob here, may be performed, drilling a clean hole from the surface of the tooth, just under the free edge of the gum, into the pulp cavity, and, after syringing this thoroughly clean, and adjusting the rubber-dam, putting a short piece of wire through the hole just made. Next fit a layer of

* The treatment here differs from Hullihen and Jacob, who do not insist upon the cavity being cleaned out, but drill into a tooth.

gold, lead, or platinum over the chamber of the pulp, resting on the wire, and the cavity may be filled with gold or palladium with every hope of its lasting free from pain, and its end will be by a gradual process of softening till it crumbles painlessly away, without the violent abscess often resulting from the method of filling fangs; though the latter is worth all the care needed, if the patient can be watched, the other being the best in cases of patients going abroad for months or years.

It is possible, even after an abscess has formed and discharged its fury, and a chronic gumboil remains, to stop the tooth in the manner just described, when the fistula in most cases will disappear, thus removing a source of discomfort. It only remains to me, Gentlemen, to thank you for the kind attention with which you have listened to me. I am only too conscious of the crudeness of my effort, and, I admit, the triviality of the details; but my object was to give definitely my views of the various points, hoping that some hearers and readers may derive a certain amount of interest from the epitome here resulting from many various cases, the record of which has been a source of pleasure to me.

I am aware this plan was mentioned by my friend Mr. Moon at our last meeting, but he and I adopted the method in our practice simul-

taneously, but without collusion, and my experience leads me thus to urge it on the Society, acknowledging much has already been written on the same subject by Messrs. Hulme, Cartwright, and Coleman.

DISCUSSION.

The PRESIDENT said that Mr. Hutchinson had brought before them a subject which concerned so considerable an amount of experience, that he hoped the members would freely discuss the question, and let the Society know the results of their attempts at saving teeth in the conditions which Mr. Hutchinson had described.

Mr. HENRY said the subject was of the deepest interest, not only to the profession but to the public, because very many teeth were, no doubt, constantly sacrificed which ought to be saved. For the last three years he had totally abstained from the use of arsenious acid, or, indeed, any escharotic, for the destruction of the dental pulp; and a very large experience had enabled him to demonstrate the fact, that they might really abstain from the practice of destroying the vitality of dental pulps. If the pulp were alive, and there were freedom from inflammation in the socket, he contended that they could save any tooth. At an early part of Mr. Hutchinson's paper he made the remark that he deprecated as much *as possible* the use of arsenic in destroying the sensitiveness of the dentine. His (Mr. Henry's) experience led him to deprecate its use *in toto*. Hr. Hutchinson, whilst deprecating this, recommended in the treatment of slightly exposed pulps a leaden cap and a paste of morphia, which, he showed, often led to the ultimate destruction of the pulp. This at once, to his mind, condemned the use of that paste. As far back as June, 1873, when Mr. Woodhouse's able paper on the treatment of exposed pulps was discussed, he had raised a feeble wail in deprecation of the indiscriminate use of escharotics; and he now lamented much that he had not more persuasive power to induce his fellow-practitioners to abstain from the use of arsenious acid in the treatment of the pulp. In that discussion he explained his simple method, which was akin to that of Mr. Woodhouse. He simply restored quiet to the tooth, and, after cleansing and

dressing the cavity, adapted a bibulous layer, saturated with carbolic acid, over the exposed pulp ; of course, never permanently treating the tooth whilst there was anything like pain in connection with it, or if the patient had recently suffered. Having fitted this bibulous layer, which he believed should be used in preference to anything of a stiff nature—even Mr. Woodhouse's recommendation of parchment he did not consider satisfactory, bibulous paper served the purpose so wonderfully well and adapted itself to the slightest inequality—a lining of osteo-plastic was then carefully inserted without irritating the pulp, and he had found, in every case where this treatment was adopted, that a metallic plug could be inserted directly the osteo-plastic had firmly set. He should like very much to hear that other members had been excluding the use of destructive escharotics from their practice. He felt that he was standing almost alone in this respect, but still he hoped it would not be for long. He did think they should abolish the use of such escharotics in the treatment of dental pulps entirely.

Mr. COLEMAN said the subject brought before them that evening was a large and important one, and included some of the most difficult cases they had to deal with. He had long intended to bring his views on the subject before the Society, and hoped at some future time to do so ; but as he could not do it justice in a few brief remarks, he would now simply state that he indulged in the use of escharotics, and it struck him that it would be found that Mr. Henry dealt a little with them too, as probably his bibulous paper allowed a little chloride of zinc to pass through and come into contact with the pulp. So it would be found they were not so much at issue. In all cases of inflamed, irritable, or prominent exposed pulps, he found that after lessening the sensibility of the surface by the use of carbolic acid, the next best application was strong nitric acid, capping over this, and in almost all cases filling at once. In those other very difficult cases that they had to deal with, where only a small portion of dead pulp remained in the fangs, giving rise to a troublesome discharge very difficult indeed to subdue, arsenic, not used as an escharotic to destroy, but as an

antiseptic, and one of the most powerful antiseptics, would get rid of this discharge ; and in a very large number of cases this was one of the very best means of curing an alveolar disturbance, and had proved most successful.

Mr. UNDERWOOD.—Mr. Hutchinson, in his very interesting paper, spoke very guardedly about arsenious acid, and those who had seen the action of this agent would, no doubt, come to the conclusion to use it as seldom as they possibly could. But he did not suppose that the author of the paper expected that his reference to arsenious acid would be followed by the remarks which had been made by Mr. Henry. He did not believe that experienced operators would go to the extent of saying that they wished to see arsenious acid banished altogether from the lists of their agents. It appeared to him that many of the evil results following from the use of arsenic was due to its abuse. He would never use it where he could possibly avoid it, but there were multitudes of cases coming before them in practice where it was a most valuable agent, though to be used with the utmost caution. When he used it he invariably told his patient, "If you suffer decided pain, remove what I have put into your tooth in six hours ; on no account allow it to remain longer. If you suffer simply a bearable amount of pain, or no pain at all" (and in the majority of cases no pain was felt), "come to me in four-and-twenty hours and I will remove it." Arsenic, although its use might be attended in certain cases with results they did not anticipate, was so valuable an agent that he could not allow the wholesale condemnation of the use of this drug to pass without giving his protest in its favour ; for he thought they were very much indebted to it in its careful use.

Mr. HENRY said that the remarks he had made were with all due deference to the experience of his senior brethren. He only spoke from his own experience, and had endeavoured to do that faithfully. Since the introduction of salicylic acid he had tried that agent in place of carbolic acid, and had recently treated two or three teeth with salicylic acid alone. He had

so far met with success, and only waited for time to show its real value.

Mr. C. S. TOMES, referring to what Mr. Coleman had said about the use of nitric acid, observed that Dr. Taft, of Cincinnati, the author of the manual on operative dentistry, had for many years made a practice of touching a nerve exposed in excavation with it, and he had seen him fill two teeth at once with gold, having thus lightly touched the exposed nerves, and without putting any protective layer whatever between the gold and the pulp. He considered that the eschar formed by the nitric acid was in itself a sufficient cap. No inconvenience followed this treatment in the cases seen. In pulps exposed by decay the inflammation was often very local. In such a case the application of a little nitric acid would destroy the inflamed spot, and the nerve would have, as it were, a fresh start. At all events, Dr. Taft had for many years made a practice of touching with nitric acid and filling at once over it without any protective layer, and with extremely successful results.

Mr. VANDERPANT had occasionally applied the actual cautery in cases similar to those alluded to by Mr. Tomes. He touched the surface very gently with the wire, which must be *white hot*: the pain caused was trifling and of short duration. In his experience he had found the completion of the operation attended with much less difficulty and inconvenience both to patient and operator than was usually the case. Of course it required care, and he should never think of thrusting the wire bodily into the pulp. He did not complete the stopping immediately after the application of the cautery, but usually applied a temporary filling of Godiva, or cotton wool saturated in camphorated gum mastic; but in this, of course, he was guided by the condition of the mouth and contiguous teeth.

Mr. OAKLEY COLES said they were all exceedingly obliged to Mr. Hutchinson for having brought this very important subject before them. With reference to the remarks on

pepsine [paste, his continued experience only confirmed him in the opinion he had formed of it at the first as to its efficacy. He confined its use almost entirely to those cases where there was a suppurating pulp and exceedingly offensive discharge. Pepsine paste dissolved away the dead or disorganized tissue far more efficiently than any other agent with which he was acquainted. He thought they would be pretty well agreed that arsenious acid was about the most perfect agent they could possibly have for destroying pulps. In reference to capping pulps exposed by accident or recently exposed by decay, he had found touching them with carbolic acid and putting over that a stopping of osteo-plastic immediately in contact with the pulp, had answered satisfactorily ; but where there was any inflammation remaining, he knew that this plan did not do well ; the pain recurred after a short time and the stopping had to be removed. If a pulp were accidentally exposed or could be exposed by removing only very soft dentine, then if that were touched with strong carbolic acid and osteo-plastic put on at once, there were very few cases in which there would be any trouble. He was exceedingly glad to hear this protest against the wholesale slaughter of dental pulps. He had always regarded it as a confession of ignorance, that they should have so frequently to destroy the pulp. It was simply an admission that they did not know how properly to restore it to a healthy condition. It seemed as reasonable for a surgeon in amputating a thigh at the lower third, to clear out the medullary canal of the femur, as for them to clear out a dental pulp in order to treat a carious cavity.

Mr. VANDERPANT thought that when Mr. Henry said he eschewed all escharotics he forgot that carbolic acid was a very powerful one, because it certainly produced, like all other escharotics, an eschar.

Mr. HENRY eschewed escharotics as a means of destroying the dental pulp, objecting to them only on that score. It was quite true that carbolic acid produced an eschar on the surface of the exposed pulp—an insoluble layer, which was the great

medium of their success. A case he brought before the Society some three or four years ago, in which he treated a tooth with polypus of the pulp, illustrated this feature so forcibly that he had acted on it ever since. He excised the polypus, which was the size of a small pea, stanching the hæmorrhage with carbolic acid, keeping the strongest solution in contact until the surface was thoroughly blanched, capped the pulp at once with the bibulous layer, and stopped the tooth with Guillois's cement. The gentleman, a resident at Hastings, had that tooth now. It was a tooth which most practitioners would have condemned, and he condemned it on the strength of the writings of their first teachers; but the patient said, "I won't have that tooth out." Then he suggested the alternative of cutting off the polypus. It did happen that where carbolic acid was used they had, exceptionally, death of the pulp ensuing; but he believed, as a rule, carbolic acid acted as a preservative, and the point was, not to get a morbid action through pressure or the presence of any air vacuum. White eschar was produced through the action of the carbolic acid on the albuminous element of the exposed pulp and by sealing out the air at once. He believed a layer remained which assumed a healthy condition, or else after-irritation would ensue,—a result he rarely, if ever, met with. In his experience the failures were remarkably few.

MR. THOMAS A. ROGERS said this was a subject in which he had always taken deep interest. In the very first year of this Society's existence he had the pleasure of reading a paper on "Capping the Exposed Pulp," and, some time afterwards, on "Fang-filling." And, with the view of encouraging research into the subject of the treatment of the exposed pulp, he had had the honour of offering prizes to the students of the Dental Hospital for the best reports of cases. So that he was personally much indebted to Mr. Hutchinson for bringing the subject forward, and had taken great interest in the debate. He apprehended the object of capping the exposed pulp was to promote the formation of secondary dentine under the filling. In the cases which he had noted down many years ago, and which

formed the basis of his paper, he found that, where powerful escharotics had been used—even before the pulp was exposed—for the relief of the sensitive dentine, if the pulp was then exposed, the chance of succeeding in the operation of capping it was very much diminished; that, from some cause or other, the pulp almost invariably suppurated, and had to be removed; and that not unfrequently the tooth was lost. Since then the researches of Mr. Tomes, Mr. Charles Tomes, and others, had shown the reason of this; and he believed that when once the layer of odontoblast cells had been destroyed, either by a sufficiently severe wound, or by the action of escharotics, no further formation of dentine took place, nor was there much hope of the formation of osteo-dentine. It was true, they might have cases linger on for two or three years, but ultimately the teeth would come to grief, perhaps from some slight cause such as a bad cold, or during some general disturbance of the system. His experience when he read that paper—nearly twenty years ago—was, that when once severe inflammation, or suppuration of the pulp, or of any part of it, had been set up, it was necessary to destroy the whole pulp, and to fill the roots of the tooth, and he was still very much of that opinion; but he had listened with the deepest interest to the remarks which had been made, and should look forward with more than ordinary expectation to Mr. Coleman's paper. With regard to the use of arsenic in the destruction of the pulp, he, for one, could not understand how it could be done without in many cases. The pulp was generally so exquisitely sensitive, and the patient often so apprehensive, that it was difficult to effect the operation unless the pulp was first devitalised to a great extent, and he knew of nothing like arsenic for that purpose, both because it so speedily devitalised the pulp and also rendered it more easy of removal. But it should be employed with very great care, and never, if it could be avoided, to the extent of destroying the whole organ. The great bulk of the pulp should be destroyed by it, but it should always be living at the point of excision. He always preferred a slight bleeding at the point where he excised the pulp, expecting in that case that there was not much fear of after ill effects from the arsenic,

and that if the gold filling were inserted immediately, so as to exclude the air, healing by first intention was probable. In such cases and with such precautions arsenious acid was of the greatest use.

Mr. KIRBY was very pleased to hear from Mr. Rogers that he had found those cases answer most satisfactorily in which there was still a certain amount of vitality left in the nerve. He had long noticed it in his own practice, and had intended to bring the matter before the Society with a view of seeing whether the experience of others was the same. He found if he had to cut off a tooth with a living nerve for pivoting, the operation was never followed by gumboil ; but if the nerve was dead, he had never known it to be thoroughly satisfactory and free from after-irritation for any considerable length of time. He believed, when reading it recently, that a remark their President had made many years ago was intended to convey that idea to them. In reading it the first time it did not strike him, nor until his own experience had brought him to the same point. It was a thing very satisfactory to know, because it tended very much to help them to success in these cases. A very important point in applying arsenic was to take very great care that it was thoroughly in contact with the pulp. He never applied arsenic without cutting off a portion of the surface of the pulp with a small spoon excavator, and then he used the very smallest possible quantity mixed with carbolic acid : he put it well into contact with the exposed part, and covered it over with a plug of wool steeped in mastic, or a solution of gum benzoin, and not in one case in twenty had he heard of pain being experienced in such a tooth after the first hour from its introduction.

Mr. SEWILL thought that far too large a number of exposed pulps were dealt with, the reason being that pulps were very often exposed in operating. In certain text-books the broad rule was laid down that the whole of the carious dentine must be excavated from the cavity. He thought that rule was entirely wrong, and one which led to a great many pulps

being exposed. The presence of a small quantity of softened dentine at the bottom of a cavity could have no injurious effect, and it might be left there with perfect safety. In a deep cavity, if a portion of softened dentine were reached which was not in the last stage of disintegration, but softened into a cartilaginous state—having all the earthy constituents dissolved out—the question was whether it should be removed, and the tooth treated afterwards. If such a layer of dentine were removed, it was necessary to substitute a cap, which would not answer the purpose so well as a layer of softened dentine, not to speak of the extreme difficulty of applying the cap satisfactorily. Caries was due to external agencies; and if a layer of softened dentine was sealed up under a filling, it could not give any further trouble. The treatment of softened dentine in that condition might also be carried out until it was brought into a more suitable condition, by means which he need not then enter into.

There had been, to some extent, a slight confusion in some quarters in laying down a particular rule for the invariable treatment of exposed pulps. A good deal was known of the pathology of the pulp; its structure was known, and that it was subject to pathological changes essentially similar to those occurring in other soft tissues. That was a point that was a good deal lost sight of. In dealing with the dental pulp they were not dealing with any structure which presented such an extreme modification in its constituents as to render it totally unlike other structures of the body. In dealing with the pulp they were treating a structure composed of areolar tissue, blood-vessels, nerves, and a certain number of specialised cells. They were not treating anything mysterious in its nature, and it must not be dealt with empirically. The pulp presented half a dozen different pathological conditions. It might be healthy or irritated, inflamed, suppurating, or partly gangrenous; and to say that one treatment was to be indiscriminately applied to all such conditions successfully was contrary to reason. He could understand that the capping of an exposed healthy pulp could succeed, but he could not conceive how capping a pulp partly gangrenous could by any means

succeed, and he did not see how the treatment for destroying the remainder of such a pulp could be done away with. The diagnosis of the exact condition of a dental pulp in a state of partial gangrene was extremely difficult. It could not be examined in those cases in which the nerve was extensively damaged by gangrene or ulceration ; the only treatment that could be employed, based upon reason, was the destruction of the remainder of the pulp. With reference to the treatment of the exposed healthy pulp by cautery or the application of nitric acid, until he heard the *rationale* more thoroughly explained, he should not use them. It appeared to him that, knowing the structure of the pulp, it was quite contrary to the facts to apply a caustic to a tissue like exposed pulp. With what other part of the body in similar circumstances would they deal in the same way ? It was possible some of these cases might succeed, but it was difficult to know whether they were actually cauterised, because in his experience when you attempted to touch an exposed pulp, even in the strongest and most resolute man, he would give such a plunge as to make it doubtful whether the pulp was even approached. Some of the cases in which there had been success might be explained in that way—that the pulp had not even been touched by the escharotic or the hot wire. In those cases in which the cautery or caustic was used the difficulty was the limit of it. It was easy to say “Apply nitric acid,” but how much was to be applied ? So with the cautery. They could not tell whether the wire was plunged into the depth of the pulp or merely touched the surface. In regard to arsenic, he used it exclusively in cases in which it was necessary to destroy the pulp. It very rarely happened that pain followed the application of the arsenic. He took care, as Mr. Kirby had said, to see that it was in actual contact with the pulp, and that, in sealing it, he caused no pressure. He carried a portion of bees’ wax to the orifice of the cavity, and caused it to adhere with a warm instrument. He could not agree with the opinion that a pulp might not ossify if the odontoblast layer were destroyed ; he thought possibly it might. Probably the chance of actual organic union between the new layer of dentine and the pre-existing dentine was not

very great ; but he thought ossification might take place even after the odontoblast layer had been destroyed.

Mr. VASEY thought they were much indebted to Mr. Hutchinson for the very interesting discussion his paper had elicited ; but he was afraid that, in his anxiety not to give too long a paper, he had not done himself sufficient justice. The remarks of the members had been principally in reference to the treatment followed by the various speakers, rather than to the mode Mr. Hutchinson had advocated. He should be pleased indeed if, in answering those remarks, he would explain the physical changes he had observed resulting from his mode of treatment, either in the diseased or exposed pulp.

Mr. STOCKEN agreed with Mr. Henry, and had rarely been unable to succeed in the treatment of diseased and exposed pulp by carbolic acid, which was not only an escharotic, but an antiseptic, and therefore most beneficial in the treatment of a suppurative pulp. His plan was to put in cotton-wool saturated with carbolic acid, and close it up with cotton-wool and solution of mastic ; renewing it once or twice a week until there was neither secretion nor fœtor. He then put in a piece of clean cotton-wool, and if, after remaining in the cavity for a week, it was neither stained nor offensive, he proceeded to stop the cavity as a safeguard. He generally capped with a little cotton-wool saturated with carbolic acid, mopping it dry with cotton-wool, and then filling either with gutta-percha or an osteo-plastic stopping. He requested the patient to return to him in four or six months, or earlier if he had any discomfort, and he then permanently stopped the tooth. He had scarcely ever found that treatment to fail. Nitric acid ought to be used with the greatest hesitation ; considering the chemical composition of the teeth, it certainly seemed scarcely an agent they should use. It was difficult of application, and when there were other remedies at hand which would answer the purpose, they should discard one that was so corrosive and destructive, and which required such extreme care in its use.

The conservative treatment was unquestionably the one that ought to be adopted in the treatment of exposed and diseased pulps.

Mr. MOON was glad to find from the discussion that evening that the use of arsenic as an agent for destroying the vitality of the pulp in fitting cases had found able defenders, but would still like to hear from those gentlemen who were so strongly opposed to its use what evil results had followed its application in their experience. In his own practice he could only call to mind one case in which a bad result had followed its use, and that was due to the escape of some of the arsenic from the cavity, and to its coming in contact with the gum, causing localised ulceration of that structure, some periodontitis, which soon passed away, and an unnecessary amount of pain.

With regard to the treatment of teeth after the pulp had been extirpated, the question arose whether it was necessary that the root canals should always be filled. In many cases when sphacelus of the pulp occurred spontaneously, its decomposition, or the conditions of irritation which had led to its loss of vitality, would have induced more or less irritation or inflammation of the periodontum ; and in such cases the operation of rhisodontropy, as mentioned by Mr. Hutchinson in his paper, came into use with very good effect.

Mr. HUTCHINSON said that owing to the lateness of the hour he would reply but briefly. He had scarcely expected to have to apologize for the shortness of his paper referred to by Mr. Vasey, because he had said at the beginning that his intention was simply to relate as *briefly* as possible the method that he had himself adopted in the treatment of the dental nerve pulp in life and in death, and he had apologised at the same time for not quoting all the authorities who had previously dealt with the question. He had also asked as a special favour that the elder members of the Society would give their valuable opinions, and personally he was very grateful to those gentlemen who had done so : both to himself and the younger

members of the Society their remarks had proved of the greatest interest and instruction. He should look forward with much interest to Mr. Coleman's further treatment of the subject. He had frequently adopted Mr. Rogers's plan of the gold cap, but did not mention it among other matters, as he almost invariably pursued the system detailed in his paper. Mr. Henry, and perhaps others, had misunderstood him as to the paste of creosote and morphia : it had no arsenic in it to destroy the pulp ; it was intended only as a healthy capping to a healthful pulp. He entirely concurred with Mr. Underwood's reply to Mr. Henry's remarks on the use of arsenic. Many other points had been alluded to which bore rather on the remarks of previous speakers than on his paper, and therefore, without trespassing further on their time, he begged again to thank them for their attention.

The PRESIDENT said it only remained for him to thank Mr. Kirby for exhibiting the pneumatic plugger, and for his remarks upon amalgams ; and Mr. Hutchinson for his very valuable paper. He was glad the subject was likely to be reopened by Mr. Coleman, because he felt they could not devote too much time and attention to the question. It had always struck him there were two extreme cases they should bear in mind,—pivoting, where they destroyed the pulp, and put a piece of gold wire in its place, the stump conducting itself peaceably for a course of years ; and the other the less frequent case, in which the pulp was fully exposed by fracture of the crown, in an attempted extraction, covered with coagulum, the gum partially healed over, and at some future day it was found that the pulp had not died, but was really converted into osteo-dentine. In the Museum there were several such cases, and he had no doubt, if carefully looked for, other cases might be discovered. Such cases as these encouraged one in the notion that in a vast number of instances the pulp might be saved. No doubt the attempt to extract the teeth was made because they ached, and could not be borne any longer, and the pulp, instead of dying under those circumstances, had become converted into secondary dentine. He hoped in the next paper

upon the subject these cases would be taken into consideration in estimating the kind of treatment to be adopted.

The usual vote of thanks for the donations to the Museum having been passed,

The Meeting adjourned to December 6th.

GENERAL MONTHLY MEETING,

December 6, 1875.

ALFRED COLEMAN, Esq., VICE-PRESIDENT, IN THE CHAIR.

THE CHAIRMAN, on taking his seat, said, the members would regret to see him in that position when he informed them that it was in consequence of the indisposition of their esteemed President, who was confined to the house by a severe attack of cough and cold, but he was glad to be able to add that he had ascertained that afternoon that Mr. Tomes was decidedly better.

The Minutes of the previous Meeting were then read and confirmed.

Messrs. UNDERWOOD Jun., and WEST, were appointed auditors to examine the accounts of the Society previous to the Annual Meeting.

The following gentlemen were elected resident members :—

Mr. FREDERICK CANTON, 18, Great Marlborough-street,
Mr. THOMAS C. STELLWAGEN, Chesnut-street, Philadelphia,
U.S.A.

The following gentleman was proposed as a resident member :—

Mr. J. HENRY WHATFORD, 37, Cavendish-square.

The following gentlemen were proposed as non-resident members :—

Mr. HENRY MALLET, 1, Bedford-circus, Exeter.

M. LUIGI MARTINI, Via di Po, Turin.

Mr. GEORGE ROBINSON DOUGLAS, Isle of Man.

The following gentlemen signed the obligation book :—

Mr. AYLIFFE WATTS WHITTINGHAM.

Mr. JOHN D. HATFIELD.

Mr. TURNER exhibited a specimen of true exostosis, a bony tumour appearing on the fang of a second bicuspid, which was a solitary tooth, and was removed with considerable difficulty, owing to the shape of the tumour. The apex of the fang was perfectly clear and defined, and the whole of the tumour was on the posterior or distal surface of the root.

The CHAIRMAN said this was a very interesting specimen, and differed somewhat from those generally met with. Those they were accustomed to see, might perhaps be more properly termed hyperostoses, but this case would be recognized as a true exostosis.

Mr. HUTCHINSON mentioned a case of considerable elongation and separation of the central incisors, which were somewhat loose. The patient was about twenty-nine years of age, having all the teeth present in the lower jaw, but only ten in the upper. He was at a loss to discover the cause of this separation and elongation,—whether it was from a deposit of tartar on the lower incisors—causing them to rise on their sockets, to impinge on the centrals and push them forward—by irritation causing elongation, or whether it resulted from forward pressure caused by the eruption of the wisdom teeth. He should be glad to know whether the case was remediable. The result was most unsightly, and unfortunately was increasing at the rate of about $\frac{1}{32}$ nd of an inch in three months.

The CHAIRMAN said this was a case not unfrequently met with ; he believed the cause was more especially due to the loss of the teeth at the back of the mouth, so the few teeth which remained, having to bear the whole pressure, were to a certain extent driven into their sockets. Thus, for instance, the first molar of the lower jaw on the right side was considerably shorter than its neighbours. That might not, perhaps, exactly account for the elongation of the central incisors, but probably it was due to some extent to the irritation caused by pressure. With regard to treatment, he believed the case would be met to a considerable extent by supplying some teeth to the upper jaw to relieve the pressure on the first molars of the

lower jaw, and preventing the lower incisors impinging as much as they did upon the incisors of the upper jaw.

Mr. HUNT said his father had watched a case for more than forty years, in which the central and lateral incisors occupied about forty years ago their normal position, but the gradual loss of the molars in each jaw involved a great deal of pressure on the posterior surfaces of the incisors, and they gradually lost their vertical position, being now almost horizontal.

Mr. DAVID HEPBURN said they occasionally met with cases of this sort, which did not seem to be due to pressure of the lower teeth upon the upper incisors, as these teeth appeared to separate and elongate, whilst the lower were biting upon the gum considerably behind them. He therefore thought they had not quite arrived at the true cause of the disease, and did not know that any one had ever satisfactorily explained it. Such cases were very difficult to deal with in practice.

Mr. HUTCHINSON said he had had occasion, at a past meeting of the Society, to call attention to a similar case, and his object in doing so that evening was to get some further information on the subject if possible, because it was a point well worthy of being worked out. He hoped to be able to find some cause for it, but was utterly at a loss to do so at present. Mr. Taine noticed as a specialty of English women that their centrals elongate and separate, giving them a "carnivorous" expression. He mistook the centrals for the canines, but that was the remark he made. It would be exceedingly interesting to discover the cause, and still more interesting, and, more than that, satisfactory, to find some remedy for it.

The CHAIRMAN said the subject had for a long time occupied his attention. One cause they might assign for it was want of use. In cases in which teeth did not receive an antagonistic pressure there was a tendency for the teeth to elongate, and to be, in fact, exfoliated from their sockets. He believed this was due to a condition that was always taking place, namely, that condition which caused teeth to be erupted—the growth of

bone from its vascular or nutrient centres to its surface ; a growth of bone was continually going on from the parts at which the bone was formed, the nutriment centres, the vascular portion towards the surface, and was there absorbed by the periosteum, or adjacent structures. It was in this way only they could account for the eruption of the permanent teeth, and also of the temporary teeth. This action was constantly taking place, but was checked in the case of the molars, or bicuspid, by their antagonizing other teeth. In the case of the incisors, which did not directly impinge upon other teeth, they were kept in their place by the action of cutting or incising food which was assigned to them. But in the present state of society, when their food was presented to them in a softened state, and the knife and fork usurped the true office of these teeth, their early loss by falling out was very common, and, indeed, it was rather remarkable that this condition was not the rule rather than the exception. That it was greatly on the increase there could be no doubt. When patients would not bear any mechanical appliances, he had recommended, and in some cases with very considerable success, pressure by the finger or thumb ; for instance, that whilst employed in reading or any similar occupation, they should press the thumb gently, but steadily and continuously upon the tooth. If that was persevered in, he thought they would find, even in such a case as Mr. Hutchinson's, that after a time a very considerable improvement would take place.

Mr. HUNT mentioned the case of a young lady, twenty years of age, who called upon him about a twelvemonth since with the left central incisor becoming elongated. It had come down perhaps one-sixteenth of an inch. She was a very handsome girl, and, as she showed her front teeth very much, it was a serious question what to do. The tooth was a little loose. He could do nothing except cut it down with the engine, and harmonize it with the adjoining incisors. Six months passed, and the same elongation occurred again, the tooth still getting looser. The left canine was not present, but the denture with that exception was perfect. On seeing the patient a week ago, he found the central incisor had become so loose that her

doctor had taken it out for her, and on examination he found the canine just peeping through the gum, occupying the space between the lateral incisor and the right central incisor. Though not unique, it was an uncommon case. Under such circumstances he wished to know what would be the next best step to do ; should the canine be removed, or should he wait and attempt to cut it, so as to harmonize it with the other teeth ?

The CHAIRMAN said the Society could hardly give an opinion without seeing the model. The method of treatment would depend upon how far the canine filled up the gap and how far it might be made to correspond with the other side of the mouth.

Mr. HUNT said only one-eighth of an inch at the apex was through, so that he could scarcely tell.

Mr. Moon and Mr. Oakley Coles brought forward a case of mechanical adaptation of an artificial palate and teeth, and the patient being in attendance, Mr. Parkinson, Mr. Hepburn, and Mr. Vasey were appointed to examine and report on the case. Owing to pressure of time, a description and discussion of the case was postponed to the next meeting.

*Decomposition of the Dental Pulp the cause of
Periodontitis.* By A. W. BARRETT, M.B.,
London, M.R.C.S.

MR. PRESIDENT AND GENTLEMEN,

I DO not propose, in this paper on the Decomposition of the Dental Pulp, to enter at length into the causes of putrefaction; yet I think it of advantage to regard for a moment the theory on this subject held by Professor Lister, the advocate for the use of carbolic acid in the practice of surgery. Decomposition, he asserts, may be averted if the admission of putrefactive germs to the substance prone to decomposition be prevented. He regards carbolic acid as a substance which has the power of rendering these germs inert, and of shielding organic matter from those particles that would otherwise excite in it destructive changes. I have seen Dr. Letheby, when demonstrating the properties of carbolic acid, expose two pieces of meat to the air for fourteen days in summer, one having been previously wetted with a solution of carbolic acid. At the end of that time the protected piece was free from any sign of putrefaction, while the other was much decomposed: thus was shown the powerful antiseptic quality of the acid. When the dental pulp dies, its ten-

dency, if uninfluenced, is to become putrid. During this process much sulphuretted hydrogen gas is evolved, which makes its way into the mouth through the opening which caries has usually made into the pulp-cavity.

But it may happen that this aperture is absent, either from decay not having extended so deeply as the pulp-cavity, or from the filling up of this opening by a particle of food, or by the operations of the dentist, as when the latter places a filling over an exposed nerve. Then though constantly this gas is set free from the putrescent pulp, it can find but one road to escape, — *that* lies through the opening at the end of the fangs. While doing this, particles of the semi-fluid nerve débris are forced through the fang extremities into the socket in the alveolar process. The result that usually follows inoculation with putrescent animal matter occurs in this instance: inflammatory action is lit up around the fang, leading often to the formation of an abscess, and the escape of pus through the alveolar process into the mouth. Fortunately, owing to this ready means of exit afforded to the products of inflammation, pyæmia never results from this septic inoculation. Were the channel less open, the consequences might be more serious.

The occurrence of this alveolar inflammation depends primarily on a purely mechanical cause,

to wit, the expansive action of the sulphuretted hydrogen gas shut up in the pulp-cavity, and if the opening at the end of the fang be obliterated, as in old age it often is, the putrid nerve may be locked up in the tooth for years without causing any inflammation outside the fangs; but severe periodontitis is quickly produced around younger teeth, in which slight pressure from the contained gas serves to drive a good deal of putrid matter through the large canal and terminal opening in the fangs.

Periodontitis is sometimes regarded as the result of the extension of inflammation from the tissues within the tooth to those without: this does not appear to me to be the pathology of the condition. In nine cases out of ten I think it is caused by the injection into the socket of putrid particles from the interior of the tooth. On opening the pulp-cavity of a tooth around which periodontitis is going on, we find almost invariably the pulp dead and fetid. The act of opening the pulp-cavity will always relieve the alveolar inflammation, by allowing the gas to escape into the mouth, from the interior of the tooth. Occasionally periodontitis occurs while the nerve-pulp is not decomposed. I have seen it result from the application of arsenious acid for the purpose of devitalizing the nerve. The irritation produced by the mineral poison appears in these cases to have extended into the socket through the openings at the fang extremi-

ties. We have in carbolic acid a substance which by preventing decomposition within the tooth will prevent inflammation without, and I cannot but think that the objection existing to the use of arsenious acid has chiefly resulted from the non-use of this antiseptic after the pulp has been devitalized. After the latter process a filling, perhaps, is placed in the cavity, the interior of the tooth still containing shreds of dead animal matter, which soon decompose, as the air with its accompanying germs has been admitted into the tooth, and ere long a putrescent globule is forced from the end of the fang, and periodontitis is lit up. The risk of the latter is obviated after the use of arsenic, if the nerve, when dead, be cleared out from the fangs as thoroughly as possible, and if the interior of the tooth be then plugged tightly with wool dipped in carbolic acid: over this the metal filling may be placed without fear of a bad result. I also think, the mode of treating periodontitis will be much modified if we admit its causation by the imprisoned gas within the tooth; our object of course will then be by drilling through the crown into the pulp-cavity to afford a vent to the elastic vapour. Common experience shows that this mode of treating this affection is usually productive of relief.

With the aid of Morrison's drill, an opening may be made with great readiness. The decomposed contents should then be well removed,

and carbolic acid freely introduced. The vent-hole may be allowed to remain for the escape of gas; after a couple of months it may be plugged experimentally; if periodontitis is again caused, the aperture must be again restored.

But the treatment of teeth chronically inflamed is unsatisfactory, and too often ends only in extraction. That it should do so is evident, on consideration of what I believe to be the pathology of the condition; for what can it avail to apply palliatives to the outside of the tooth while the cause of disease remains? While fetid matter is leaking from the ends of the fangs, how can it afford relief to poultice the face, to blister the gums, or to fill the carious cavity with medicated wool? and even if treatment more likely to bring relief be adopted—if the pulp-cavity be laid open, so that the contents are relieved of pressure, the benefit is too often of a temporary nature only. No sooner is the pulp-cavity again sealed by the insertion of a filling than the old trouble returns, and treatment must be recommenced. However, patients will not always consent to extraction, and, failing that, the best thing is to open the pulp-cavity, and thoroughly carbolize the putrid contents.

If Mr. Coleman's plan be followed of the extraction of teeth in this condition, their cleaning and subsequent replacement in their sockets, one might perhaps with advantage plug

the terminal openings in the fangs to prevent further leakage.

The treatment would, at any rate, be consistent with the pathology of the disease, but I should hardly hope for much success in its practice.

In conclusion, one may generalize thus : Periodontitis, with rare exceptions, is caused by decomposition of the dental pulp, and if the nerve be in a putrefied condition it will cause periodontitis, unless (1st) leakage into the socket be prevented by the senile change of obliteration of the terminal openings in the fangs, or (2nd) an opening exist through the crown into the pulp-cavity, allowing gas to escape into the *mouth*.

Gentlemen, I beg to thank you for the kindness with which you have listened to these remarks ; as far as I am concerned, no originality can be claimed for the ideas I have expressed. They are gathered chiefly from the experience of my uncle, and though the mode of their arrangement may justly merit criticism, I hope the latter may be averted by the importance of the subject I have introduced.

The CHAIRMAN said they must have all listened with great interest to the very excellent paper which Mr. Barrett had kindly furnished. It opened up very many important subjects for consideration and discussion, and would, he was sure, be fully and freely discussed. He (the Chairman) was about to

read a paper on subjects so closely connected with the questions touched upon by Mr. Barrett that, after hearing that gentleman's paper he would, with their approval, at once read his own, in order that the two might be discussed together. The meeting having shown their approval of the Chairman's suggestion, the following paper was read :—

*On the Treatment of the Dental Pulp when exposed
by disease, and of Dead and Discharging Teeth.*
By ALFRED COLEMAN, Esq., F.R.C.S.E., L.D.S.

GENTLEMEN,

I HAVE long promised myself the pleasure of performing a duty incumbent on every member of a Medical Society ; viz. the making common property any plan, or method of treatment, which in his experience has proved more successful than those generally in use. At a recent meeting of this Society the above subject came under discussion, and I then promised that I would at an early period lay before its members the plans of treatment I had found most serviceable, which pledge I now purpose to redeem. Like many others, I have long endeavoured to carry out operations for filling teeth with the preservation of their vitality :—the objections to the opposite course I pointed out so long ago as the year 1860, in the first paper I had the honour of reading before this Society,—and which endeavour has been attended with more or

less success, the less in this case probably being the greater. Where, however, success has been attained,³ the process has usually been tedious to both patient and practitioner, and the failures have so generally been due to negligence on the part of the former that I have long aimed at plans of treatment which might as a rule be carried out at one and the same visit. Exposure of the healthy pulp in the process of excavating a tooth is so readily treated, and the conditions of the organ so different to those which exist when it is laid bare by disease, that we can hardly draw a comparison between the two cases ; yet, if we are able to make the latter imitate the former by causing the exposed ulcerating and discharging surface to assume a healthy one, and then effectually protecting it from all external sources of irritation, we may surely hope for an equally successful result ; and this object I thus attempt to bring about. I would select those cases which have been regarded as the least fitted for destruction by arsenic ; viz., where we see the pulp exposed, crimson in colour, and even granulating into the carious cavity beyond its normal limits. Clearing away as much of the softened dentine as possible, without inflicting any pain, I obtund the sensitive surface of the exposed pulp by freely applying to it crystallized carbolic acid rendered fluid by a few drops of chloroform. The surface being quite blanched, I take a small disk cut out from an address-card, immerse it in

the strongest nitric acid, and lay it directly upon the pulp, a sensation more akin to discomfort than pain being felt. Should the exposed pulp have assumed a polypoid form, I may repeat the process once or even twice. After allowing the nitric acid to remain in contact for two or three minutes, I remove the disk, and neutralize the acid in the cavity with an alkali ; after which, cap the surface with thick paper moistened with carbolic acid ; cover this with a coating of oxychloride of zinc, and when this has fully set, fill over with foil, amalgam, or Jacob's gutta-percha, according to circumstances. When I first adopted this process I always filled the tooth temporarily with the oxychloride of zinc, hoping that in a short time calcification of the pulp might take place ; such, however has never been my experience. It has always been found healthy, and covered only by the thinnest pellicle of tissue ; and as I occasionally injured it in removing the oxychloride, I have latterly almost invariably filled the tooth permanently at once. To say I have had no failures would be great exaggeration ; but, including the cases above referred to, I have met with an amount of success to fully warrant me in recommending its adoption by members of the Society, hoping that, under abler hands, the process may be rendered more perfect.

The next class of cases which may be permanently treated at the single visit are those where the pulp has lost a portion of its substance, some

of it existing in the pulp-cavity, or at all events in its fang or fangs. To attempt to preserve the vitality of the pulp, or any portion of it, under these conditions, would no doubt be fruitless, and the best treatment is doubtless destruction by arsenic and fang-filing; but conditions may forbid the running any risk of inflicting pain or the possibility of a second visit; under these circumstances, especially if the tooth be quite free from periosteal mischief, I should fill, leaving a drainage-duct; thus, if with foil, by retaining a small piece of polished iron binding wire from the pulp-cavity to the exterior, and when the process was completed drawing out the wire with a pair of pliers, or, better still, by drilling a fine hole through the side of the tooth, and just below the free margin of the gum into the pulp-cavity. If with amalgam, cap over pulp-cavity with disk of thick paper, and when filled pass through amalgam a fine-pointed instrument, no thicker than a small needle, until the paper is reached or just perforated, and then carefully remove the same. I invariably select this plan in molar teeth, where drilling into the pulp-cavity would be attended with risk of wounding the pulp, and I always, in each method, which probably varies little from those others are in the habit of employing, before inserting the filling apply freely to the pulp-cavity strong carbolic acid. Fillings thus carried out will generally last from four to seven years. I recently saw two, in

the same mouth, which had been thus treated more than seven years ago, and appeared as perfect as the day they were done; but invariably the fillings do come out, through extension of the disease by the small amount of moisture which will find its way to the interior of the tooth: the result will much, I think, depend upon the size of the drainage-duct. I have found the smallest I could make always sufficient for the purpose, and long ago discontinued the employment of tubes obtained from mineral teeth, as having this great objection. When a tooth thus treated after some years loses its filling, it will be almost invariably found that its pulp and fang cavities are quite free from discharging or any offensive contents, and on re-filling require no drainage-duct.

The third class of cases to which I desire to direct attention are those in which the pulp is dead, and where there is purulent discharge from the pulp and fang cavities, and offensiveness of the dentine itself. For these cases, generally difficult and tedious to treat, I think I can offer a plan which when tried will be largely adopted; the effective agent being arsenious acid; its antiseptic, not its escharotic, properties being those which here render it serviceable. Arsenic is probably the most powerful agent we possess for the prevention of putridity in animal substances; but as in the cases in question I have employed it with two others, viz. carbolic acid and chloride of zinc,

the results may have been influenced by their presence also. The following is the method I adopt: Let it be a dead and discharging tooth, with even an unhealthy condition of the periodontium, so that it may be somewhat tender when bitten on. I clean out, as a rule, pulp-cavity only, wash out well with carbolic acid, and introduce a disk of card moistened with same, and taking up as much arsenious acid as will readily adhere to it, and place it on the floor of the pulp-cavity over the orifice of fang or fangs, and either fill with oxychloride of zinc temporarily or pulp-cavity only, and the remaining cavity permanently. A few cases, not especially typical ones, may perhaps best illustrate the conditions and the results.

Mrs. Y., *æt.* about 60, applied to me in the autumn of 1873, respecting a first molar tooth on the right side of the lower jaw, which was frequently painful and useless for mastication. It had been filled with gold on the masticating surface, but there was a space by side of filling leading to pulp-cavity, from which purulent discharge emanated. Removed filling, treated as above, capping with oxychloride and completing with amalgam. In a fortnight's time the tooth was free from tenderness, and quite serviceable for mastication; and this condition continued up to time I last heard of the patient, some few months ago.

No. 2. Mr. C. H., *æt.* about 18, applied in May last to have left upper lateral incisor removed, on

account of pain, tenderness, and swelling of the lip and face. Advised to wait ; pulp-cavity cleared out, fang ditto partially so, and carbolic acid pumped along latter several times ; cotton, moistened with same, pressed lightly into fang, and filled over with Hill's stopping. When seen a week later, some of the symptoms had abated, but in two weeks' time appeared more severe than at first, and tooth was so tender that it could scarcely be touched. Filling removed with warm instrument, and cotton, very slightly offensive and hardly moist, removed also. Treated by arsenic, and filled over with oxychloride. Two months later, oxychloride partially removed, and tooth quite free from pain and sensitiveness filled with gold, and when seen a fortnight since, a better condition of things could not have been wished for. This case is reported on the ground that another and often very successful method, tried previously, had failed.

No. 3. Mr. H., *æt.* about 30. Upper right cuspidate had been treated a fortnight previous by clearing fang-cavity, filled afterwards with cotton moistened with creosote, and covered with Hill's stopping. Had become very sensitive to pressure. Removed filling and cotton,—latter slightly offensive ; applied arsenic capped with oxychloride, and completed with Hill's stopping. A week later, as patient was leaving for India, removed gutta-percha and filled up with gold ;

tooth still slightly tender when pressed hard in one direction.

I commenced this method of practice more than three years ago, and can call to mind no case in which the tooth so treated has given further trouble, except in a few which had not been bitten on for a considerable time, and which continued more or less sensitive to pressure; but when the periodontitis has been recent, and rather of the acute than the chronic form, I have always, I believe, succeeded in at least greatly lessening the pain and tenderness.* In children I have found the plan, if anything, even more successful; on many occasions quite curing constantly-recurring gumboil; and I may confidently say I have never seen the smallest indications to lead me to suspect any injury has arisen from the employment of so powerful an agent; the rationale of the process being, I believe, the conversion of a putrid and irritating body, such as a necrosed (not merely devitalized) tooth must be, into an innocuous one, which, as

* Since the above was written I met with a case where intense pain had been experienced for several days in a second lower molar of the right side; it had been continuous, and had caused three sleepless nights. Wishing to save the tooth, I tried the above plan, but the pain not ceasing, I, at the request of the patient's general medical adviser, removed the tooth the next day; both fangs were considerably exostosed, and came away with a growth adherent to them about the size of the top of my little finger.

we know in the case of a transplanted dried tooth, or an encysted bullet, may, though undoubtedly a foreign body, remain in contact with living tissues without exciting in them any strong disposition to either irritation or inflammation.

DISCUSSION.

Mr. BARRETT, senior, said this subject was one of the most interesting that they were ever called upon to treat; and, however much they might discuss it, there was always still open a very large field for further discussion. What surprised him very much was, with all their discussion and the variety of papers that had already appeared before the Society, they made but little advance towards settling the question. They were continually working round in a circle; first of all advocating the use of escharotics for the destruction of the pulp, and then talking of capping the pulp and saving it by every means in their power. He was old enough to remember two circles in the mode of treatment. Considering the variety and number of gentlemen engaged in the profession, and reading the number of cases occurring at the Hospital, he thought there might certainly be opportunities for reporting the absolute facts of their experience in these matters, and for drawing up categorical lists of cases, which would enable them to discuss the subject and settle it finally. He wished to offer one or two remarks upon that condition of the pulp where caries of a tooth had produced a certain amount of irritation or pain. On examination, decay might be found not to have extended far, and then without even opening the pulp-cavity the pain ceased. They were at a loss then to know whether the pulp had been destroyed by that amount of inflammation, or whether it had recovered from the attack, and was then in a condition to be stopped. He had not heard this one point touched upon, which had always seemed to be a very important one in deciding that question—if the tooth was tender on the outside upon capping, the pulp was *invariably* destroyed. In no case did they find a tooth that had been tender or inflamed outside, in the periosteum or peridental membrane, without discovering that the interior vessels and pulp had been destroyed. He should like to hear the experience of others upon this matter,

as it was one means of deciding whether they should boldly cut into the pulp and ascertain whether it was devitalized, or should trust to the symptom he had described as an absolute test of the destruction or non-destruction of the pulp. No doubt they would all agree as to the treatment to be pursued after the pulp had been destroyed and putrefaction was established. He was sorry that Mr. Coleman had not given any further account of that process of transplanting, which some year or two ago he had brought forward.

Mr. SEWILL thought they could ascertain whether the pulp were dead or alive by almost unmistakable signs. One sign was the fact of sensibility remaining in the dentine. There were rare and doubtful cases in which the dentine retained sensibility after the pulp had lost vitality, but usually in cutting into the dentine, if it were found devoid of sensibility, they might conclude the pulp was dead; and, on the contrary, if it was sensitive they might also infer that the pulp had not lost its vitality. If an inflamed or a dead pulp were confined under the dentine, they would have periostitis, for the exudations must find their way through the apex of the fang into the alveolus. In old cases they might have a fistulous opening, and the discharge escaping, the sensibility might be very slight. With regard to treatment, he would repeat what he said at the previous meeting, that in periostitis, or other diseases of the periosteum and of the pulp, it is impossible to lay down any fixed rule to go upon in every case. The treatment of each case must be based upon the pathological condition which was presented. In periostitis, as in diseases of the pulp, the causation of the disease might be very different in different cases. The first object of treatment in all disease must be to remove the cause. If they had periostitis, for example, due to general causes, it was sometimes of very little use applying local remedies, while if it was due entirely to local causes, local treatment was of first importance. So it was with disease of the pulp; they must try and make an accurate diagnosis, and base the treatment upon that. Successful cases which were merely based upon conjectures were of very little value in aiding them

in coming to a decision. If they could say, "Here is a series of cases of irritated pulp which have failed," or "succeeded," then the cases were of some value; or if they could point out cases of gangrenous pulp which had succeeded or failed, that might be valuable; but to speak of cases without knowing the exact pathological condition was not of much value in basing their treatment. With regard to treatment they were all pretty well decided, but the difficulty was to diagnose the case before them. They had decided that a healthy pulp ought to be saved, but, having ascertained that the pulp was healthy or merely irritated, he could not understand the grounds upon which any escharotic or agent of that kind could rationally be applied to it. An open pulp-cavity was a condition analogous to many surgical conditions that were met with. They might have a wound of the abdomen, of the eye, of a joint, or a simple flesh-wound; but in any of these cases, when would a surgeon apply strong carbolic acid? when would he apply the actual cautery? and when would he apply nitric acid? Upon what reason could such treatment be based? The indications in those cases were to close the wound and to prevent suppuration, to keep the part at rest and prevent pathological action. In the case of a healthy pulp they could not close the wound altogether because the dentine had gone: the indication was to put on an artificial cap. The dentine was a very slightly organized tissue that could be replaced by an artificial substitute. To apply nitric acid or any of these materials to the pulp appeared to be very irrational. He could not understand such cases succeeding unless by destroying the pulp, and experiments showed that a very small dose of nitric or carbolic acid was required for that purpose. The pulp was a very delicate tissue, and was very easily destroyed. Many of such cases seemed to go on very well, the pulp being really dead or being slowly destroyed by suppuration, the products finding a vent round the filling, or in some other way.

Mr. MOON, in answer to a question from Mr. Barrett, as to whether the presence of pain on pressing a tooth into its socket could always be depended upon, as showing that there was periosteal inflammation, said he had quite recently met with a

case that bore upon this point. His patient, a gentleman of middle age, good constitution, and apparently free from a too vivid imagination, had experienced a sense of discomfort in an upper molar tooth for some six months, and for a shorter period had felt pain when the tooth was pressed upon. On examination a carious cavity was found on the distal surface under the gum, and there was evidence of pulp-exposure, though it was difficult to make out the condition of the pulp at the exposed point. On pressing the tooth in all directions, as well as directly into its socket, he found that pain was only produced when the pressure by his finger was applied to the buccal surface at its distal corner, which led him to conclude that there was a circumscribed patch of inflammation of the alveolo-dental membrane on the buccal surface of one of the buccal roots—the tilting of the end of the root against the socket causing pressure of the inflamed tissue, and consequently pain. As the cavity of decay extended beneath the gum, and having (as he mentioned at the last meeting) once had a bad result from applying arsenic in such a cavity, he placed some blotting-paper moistened with carbolic acid over the point where the pulp was exposed, and flushed wax into the cavity, then with a Morrison's drill made a fresh hole through the crown of the tooth, and applied arsenic to the pulp so laid bare. When by this application the pulp was destroyed in the crown chamber, the tenderness on pressure was found to have completely disappeared. He therefore concluded that simple localized hyperæsthesia of the pulp had been present in the first instance, and not inflammation of the periodentine, and that the coldness of the finger, rather than its pressure, had excited the pain.

In answer to Mr. Coleman—

Mr. Moon said that pain was produced only when the finger was placed on the buccal surface at the distal corner. Some masses of secondary dentine were present in the pulp, which might account for the limitation of the pain that was noticed.

Mr. HUNT asked whether Mr. Coleman in the third class

of cases he mentioned, in which death had occurred in the pulp, advocated the application of arsenic acid as an antiseptic, and as a preventive of further trouble in preference to the ordinary method of removing the pulp.

Mr. TURNER thought that, notwithstanding the frequency with which these matters were discussed, the whole question was surrounded with difficulties, which were either of a minor nature, not easily recognized, or perhaps forgotten, when the broad principles of the application of certain substances to diseased and exposed bodies were discussed. Above everything, the condition of the patients ought to be considered,—what they could tolerate, and how far they could be manipulated successfully. He had in his recollection an instance in which he could not apply anything successfully to a tooth, and yet he felt loath to remove it. In such a case as that, the particular principles were of no avail, and he had to fall back upon something which might be found useful if long enough applied. The case referred to was a suppurating tooth-pulp in a lower molar, when he could not keep the cavity dry by any means within his power. If the patient could have tolerated the rubber dam, he could easily have applied it, but when he put his finger into the mouth of the patient, he was apt to retch. The only plan he could follow was the old-fashioned one of using camphorated spirits, or absolute alcohol. The patient became accustomed to the use of the latter. The cavity was twice dressed with it daily, until the tooth was got into a good healthy condition. There was another point connected with this case which was connected with a great many others: that is, in the lower tooth the pulp was continually steeped or soaked in suppurating matter, the canal of the tooth forming a tank in which this matter was held always in connection with the pulp. A case of this kind required much more frequent dressing than a case where the tooth was inverted, and where the condition was absolutely reversed. In reference to the application of nitric acid to a tooth, he confessed to being considerably puzzled on that subject. He had for a great many years used nitric acid for the destruction of a nerve, and

thought there was nothing approaching it, either for the absence of pain or quickness and thoroughness. He had also used it for modifying the pain which was sometimes experienced in making an opening to render the tooth canal sufficiently patent for the application of nitric acid. He had applied it until he got the pulp thoroughly exposed: but to apply it either to a living tissue, or to a partially destroyed tissue which is in connection with a living tissue, and to cover it up, was a proceeding which did not appear to him at first sight to be very scientific. If nitric acid was applied to sores, it was expected, as a result, that there would be a slough formed. He should like to know, if there was a slough formed after the acid was applied to the tooth-pulp, what became of that slough. Until that was rationally explained, he should always shrink from adopting that mode of treatment.

The CHAIRMAN called attention to the fact that one very important point in Mr. Barrett's paper, namely, the presence of gases in the cases alluded to, had not been discussed. It was not unfrequently found, on the removal of the softened dentine over a pulp-cavity, that a fluid escaped with bubbles of gas. This was a point which, he thought, deserved a little more consideration than it had at present met with.

Mr. HUTCHINSON said that one of the points he intended to allude to, was the one just mentioned by the President. He meant the alarming frequency of cases of alveolar abscess in temporary teeth. There were cases of children five or six years of age, where the first temporary molars, and still more often the second temporary molars, were almost bathed in pus. If a free opening were made in the pulp-cavity with an excavator, what Mr. Coleman had mentioned immediately took place—pus and bubbles of gas were emitted. That fact, however, was very often explained to a great extent by the tightening of the muscles of the cheek, because if the finger was pressed on the surrounding gum, bubbles of gas in the pus—and very probably air mixed up with them—came up with still greater force. He had frequently removed all the decay

from the temporary teeth, and then stopped the teeth, putting a cap over the pulp-chamber, drilling a hole in the side, rather than extract the temporary molars. He thought some more general method ought to be adopted whereby the temporary molars might be saved. He was of opinion that the pressure of food in eating on these teeth pumped the putrescent matter through the apex of the fang, which would explain the abscess being found apart from the presence of gas. Again, inflammation of the periosteum might cause death of the pulp, and *vice versa*. He should like to ask Mr. Ashley Barrett particularly some questions with regard to the use of carbolic acid. He remembered, when attending the practice of the Dental Hospital, frequently seeing cases in which the pulp had died. The pulp-cavity was opened and the cavity dressed with carbolic acid on wool. In many of those cases a frightful amount of inflammation ensued. This arose, he believed, from the wool being *wetted* with the carbolic acid. He should like to know if Mr. Barrett found this plan successful, whether he used wool perfectly saturated and moist with carbolic acid, or whether he thoroughly dried the carbolic acid, so that the wool was simply impregnated with it. He had seen a great amount of inflammation which, to his mind, was caused by putting liquid carbolic acid into a dead tooth. With regard to the use of nitric acid over an exposed nerve, Mr. Sewill had said very truly that the nerve was a delicate organization, and from this he would imagine that as soon as it was exposed by excavation, the influence of the air would be to produce inflammation. The application of the nitric acid would coagulate the albumen on the surface, and leave a sort of pellicle over it. He (Mr. Sewill) seemed to ask a question doubting whether the pulp could live after the application of nitric acid. Mr. Coleman distinctly stated that he removed osteo stoppings, and found the pulp alive after the application of the nitric acid. Therefore it appeared that a protective pellicle was formed by the application of nitric acid, and shutting the pulp up from the air preserved it from putrefactive influences.

He wished particularly to ask Mr. Coleman, in the case of a

tooth which had been aching for three or four days, whether, when the nerve was found to be exposed and of a crimson colour, without the sensation due to periosteal inflammation, when the tooth was touched, he would immediately over that place a cap with a tube through it, stopping around the tube, or whether he would wait for some days until irritation in the nerve had subsided. With regard to the physical condition of the pulp when it had been capped by one of the numerous methods mentioned by Mr. Coleman, he (Mr. Coleman) said that on several occasions the nerve was in a perfectly healthy state, and that there was, very often, no sign of secondary dentine being formed. Those were the physical changes which he (Mr. Hutchinson) had found taking place in a capped pulp. Where there was a certain method of treating a tooth with a dead pulp, he thought it was the wiser plan to keep to that method as far as possible. He had not, in the course of the discussion, heard of a case where a tooth had a hole drilled through it in order to let out a discharge, and that hole was left patent, where there had been a failure : but he had heard of a good many in cases where the pulp-cavity had been entirely occluded, even after months of careful dressing. He thought the best method of practice when there was a dead pulp was to leave an exit for the discharge, and not run the risk, at the end of two or three years, of having a frightful amount of alveolar abscess.

Mr. ASHLEY BARRETT, in reply to the suggestion of Mr. Barrett, sen., that it would be an advantage if there were more broad rules to guide us in our practice, thought that each case should be treated according to its merits. No two cases were alike, and hard-and-fast rules might rather hamper us than prove useful. In certain cases arsenic might be used, and in other cases it should not ; it was not to be condemned *in toto*. In reply to Mr. Hutchinson's question whether he had seen cases in which carbolic acid had produced inflammation or suppuration, his impression was that the application of wool and carbolic acid might have produced inflammation outside the tooth by plugging up the channel for the exit of gas and putrescent nerve, and so causing the socket of the tooth to be

injected through the opening of the end of the fang. Mr. Sewill remarked that periodontitis was occasionally due to the extension of inflammation from the pulp. It was somewhat difficult to understand how that could occur. The pulp was dead, and there was no sensation; one could hardly understand how inflammation could extend from a dead to a living body. His idea was that inflammation and periostitis was due to the cause he had enunciated in the paper. In answer to the question as to how arsenious acid could be rationally applied to a healthy exposed pulp, he thought that in those cases they must be guided by results. It often happened that after devitalizing a nerve with arsenic, and subsequently filling the tooth,—after carbolizing well the pulp-cavity and interior of fangs,—the result was most encouraging; such cases were powerful advocates for the use of arsenic in appropriate circumstances.

Mr. COLEMAN said he feared that the reading of his paper had diverted attention from the excellent one read by Mr. Barrett; and if so, he should be extremely sorry: but he considered that the two subjects were so much akin, that they might very rightly be discussed together. He thought every member of the profession would be glad to know, as well as Mr. Barrett, sen., when death of the pulp, as a fact, could be thoroughly decided upon. Mr. Barrett, Sen., however, had evidently given some attention to the subject, and it was to be sincerely hoped that his observations would appear before the Society ere long in the form of a paper. With regard to transplantation, it was not embraced in the subject of the paper he had read that evening, in which he had only dealt with the ordinary means of treating such cases as he had referred to, but they might also, in some instances, be satisfactorily treated by that means, though at the time he had advocated it, he did so rather as a special than as a general mode of treatment. In reply to the remarks of Mr. Sewill, he thought that the treatment by nitric acid had its analogy in cases that were treated in surgery in general. Mr. Sewill mentioned cases of wounds of the eye and the abdomen, and other parts, which were not so treated; but he

must remember that he was not alluding to the wounds of healthy tissues, of which there was a hope that they would heal by first intention. Unhealthy granulations and ulcerating surfaces were often treated by nitric acid, and the actual cautery was frequently employed to the surfaces of fistulæ and sinuses to effect the same object as he also had in view, viz., to change the condition from an unhealthy and unhealing into a healthy and healing.

In his paper he had not touched upon the subject of healthy pulps, but with regard to unhealthy pulps the same treatment as employed in general surgery was adopted, and generally with a very considerable amount of success, the object being to convert an unhealthy, suppurating, or discharging surface into a healthy, granulating, and healing one. Mr. Hunt had asked him why he preferred arsenic in dead teeth to the removal of the pulp, and then fang-filling. He did so under a condition which he feared might have been lost sight of by the Society. Take the case of a dead tooth—a tooth with not merely the whole of the contents of the pulp and fang cavities decomposed and in a putrid condition, but the tooth itself necrosed. If such a tooth were at any time removed, and a slice made off it, apart even from its periosteal covering or the contents of its fangs, the slice of tooth itself would be found to be in a putrid condition, and such must be a source of irritation, with a constant tendency to pus-formation of the surrounding tissues. It must not be forgotten that this state of things had to be dealt with. However carefully the fangs might be cleaned out, if the tooth itself was not treated with some strong antiseptic, a putrid substance was left in the mouth; and he believed this condition was best overcome by treating it with arsenic, which was one of the most powerful antiseptics known. He preferred using this agent to simply clearing out the fangs and filling them (which was very often a difficult and impossible process). He was sorry to say he could not inform Mr. Turner what became of the slough which was formed by the action of nitric acid; because when he had removed the oxychloride filling from those cases mentioned, he found that the pulp was in a

perfectly healthy condition, and certainly not destroyed. He had seen the same condition produced by carbolic acid, and no doubt any other escharotic might give the same result. The pulp was covered over by what he would term a thin pellicle of tissue ; it could be touched, if very carefully, with a little amadon, and it would be observed yielding to the pressure. He had seen, in one or two instances, the pulp pulsating. The little cap removed was perfectly free from any discoloration, nor was there the slightest appearance of any eschar ; but whether it had been absorbed or not he could not tell. He had to thank the meeting for the great attention they had given to his paper, and, as chairman, to convey to Mr. Barrett their thanks for the excellent paper he had read, as also to the gentlemen who had made the casual communications, and taken part in the discussion.

The meeting then adjourned to the second Monday in January.

ANNUAL GENERAL MEETING,

January 10, 1876.

ALFRED COLEMAN, Esq., VICE-PRESIDENT, IN THE CHAIR.

THE Minutes of the previous Meeting having been read and confirmed,—

The ballot was opened for the election of officers and councillors for the ensuing year.

The CHAIRMAN said that in order to save the time of the meeting and to avoid interruption, the Council recommended that in future the names of all the candidates for membership should be balloted for collectively at each meeting, and that an individual ballot should be taken if the collective ballot contained one-third black balls. They were not deviating from any principle or rule of the Society in suggesting this course, because it simply amounted to this,—viz., that if any one of the individuals were obnoxious to a certain number of members, the whole would be balloted for again, and the obnoxious individual only be blackballed.

Mr. PARKINSON, the Hon. Treasurer, having read his report,

The following gentlemen were elected resident members :—

Mr. ALEXANDER CARTWRIGHT, 32, Old Burlington-street.

Mr. THOMAS GADDES, 169, Prince of Wales-road, N.W.

Mr. DAVID HEPBURN, 9, Portland-place, W.

The following gentlemen were elected non-resident members :—

Mr. ROBERT HOPKINSON, 32, Broughton-road, Salford.

Mr. THOMAS M. KELLY, 94, Oxford-street, Manchester.

Mr. EVELYN PIERREPOINT, 359, Oxford-street, Manchester.

Mr. EDWARD N. WASHBOURNE, Mount Pleasant, Tunbridge Wells.

Mr. SIDNEY WORMALD, Stockport.

Mr. THOMAS WORMALD, 188, Union-street, E., Rhodes Bank, Oldham.

The following gentlemen were proposed as non-resident members :—

Mr. J. F. CORBETT, 3, South Mall, Cork.

Mr. GEORGE HILDITCH HARDING, Manchester.

Mr. FRANK ALEXANDER HUET, 120, Oxford-street, Manchester.

Mr. HUGH PATERSON, Sydney, Australia.

The following gentlemen were proposed as resident members :—

Mr. DAVID CORMACK, 77, Margaret-street, Cavendish-square, W.

Mr. GEORGE WM. FIELD, 39, Upper Brook-street, Grosvenor-square, W.

Mr. GEORGE WM. PAYNE, 34, Ebury-street, S.W.

Mr. LOUIS BERGOYNE PILLIN, Conduit-street, W.

Mr. AUGUSTUS WINTERBOTTOM, 16, Sloane-street, W.

The following gentlemen signed the obligation book :—

Mr. JOHN DREWITT HATFIELD.

Mr. JOHN ALEXANDER GARTLEY.

Mr. FREDERICK CANTON.

The CHAIRMAN said the Librarian and Curator were unfortunately unable to be present, but they had both written, to state that they thought that inasmuch as the donations to the Library and Museum were recorded each month, it was hardly necessary to go over them again at the end of the year. The Librarian informed him that there had been some increase in the number of books borrowed during the past year over the preceding year, showing that the Library was on the whole more appreciated; the Society had expended a comparatively small amount upon that important department, inasmuch as the Museum had entailed a rather larger amount of expense than usual; he hoped next year to have the pleasure and privilege of coming upon them for a grant to improve the Library. The Curator of the Museum made very much the same statement. He alluded to the numerous contributions which had been from time to time recorded, and also to certain valuable specimens which had been purchased from the funds of the Society; among the gifts, however, was one that had not been yet acknowledged, viz.,—an old mezzotint, presented by Mr. Frank Petty, the subject of which was a blacksmith extracting a tooth. To that gentleman they were very much indebted for a valuable contribution.

Mr. MOON said: It would be remembered that at their last meeting, a case which had been under the care of Mr. Oakley Coles and himself was introduced to the notice of the Society, and a special committee—consisting of Mr. Parkinson, Mr. Hepburn, and Mr. Vasey—examined the patient, who was then in attendance. The artificial palate, &c., used were also handed round for inspection, together with the models of the mouth. On that occasion, as time was wanting for further discussion of the case, he had undertaken to bring forward the facts relative to it at this meeting, and now proceeded to fulfil his promise. The patient (a gentleman about forty years of age) first came to him a year and a half ago. The condition of his mouth at that time was as follows: through disease and by successive operations for the necessary removal of necrosed bone, the whole of the alveolar processes of the

upper jaw, the palatine processes of the superior maxillæ in their entirety, the horizontal plates of the palate bones, the lower, perpendicular plate of ethmoid, and inferior turbinated bones were lost; so that in looking upwards into the mouth a chasm appeared, bounded in front and at the sides by the horseshoe-shaped narrow rim of the external wall of the superior maxillary bones, and at the back by the up-rolled edge of the soft palate freed from its anterior attachments to the hard palate. At one side, the anterior margin of the soft palate had suffered greater loss of tissue than at the other, but otherwise the soft palate with the uvula was then, and had since remained, healthy, being carried somewhat backwards and downwards, and resting in apposition (at an angle of about 20°) with the back of the pharynx, to the mucous membrane of which it was probably partially adherent. At this time the fetor was very great, and there was an inability to speak in a way that could be ordinarily understood. The patient was, in fact, in a most deplorable condition, but happily possessed of plenty of good courage and energy. As the healing process, after the last removal of bone, was not completed, Mr. Durham, of Guy's, under whose care he had been, sent him for a month to the seaside to recruit. On his return to town, the soft parts were in a much more healthy condition, and therefore an impression in Stent's composition was taken of the remaining maxillary rim, which was reduced to the level of the bases of the molar processes; the bite was also taken with a piece of the same composition. The models so obtained were shown. The case was of such severity that he (Mr. Moon) determined to consult Mr. Coles, who he knew had experience in this kind of case and in the working of soft rubber, and he most kindly acceded to the request that they should undertake the treatment of the case conjointly. At his suggestion, the gap resulting from the absence of hard palate was spanned by a thick and separate pad of elastic rubber, with its posterior margin gradually curving down and thinned off, so as to apply itself without undue pressure upon the soft palate, and restore its continuity with the hard. This pad acted as a bed upon which a gold plate, with teeth attached,

rested ; the plate being chambered for lightness, and curved upwards at the edges for fixture. The pad, with its subjacent plate, was kept up by springs working on the admirable swivels devised by Mr. Henry Rogers. In the model shown, it would be seen that a central incisor tooth remained, and they at first made the pad and plate to fit around this ; but one day the patient, on blowing his nose, blew out this tooth, which simplified matters.

An artificial nasal septum was also tried, but dispensed with as useless. The effect was tried of pinning the pad to the plate, but nothing gave such a satisfactory result as the arrangement that was shown at the last meeting, and had now been described ; great care was used in adapting the vulcanite pad to the inequalities of the remaining ridge of jaw and its tender mucous membrane, and also in making the pad as smooth as possible.

The exact model of the pad was thus obtained : the posterior portion of one of the pads accurately adapted to the yielding soft palate, was cut off and fixed *in situ* on the gold plate ; softened Stent's composition, of a rather greater thickness than required for the pad, was then placed on the anterior portion of the plate (which thus acted as a tray), and the mouth was closed to the bite. When Stent's composition was set its edges were carefully smoothed off to such an extent as to allow a rounded margin to slightly project above the up-turned edge of the plate. The way in which the difficulty of making a smooth pad of elastic rubber of this thickness was overcome he would leave to Mr. Coles to describe, as that part of the work was entirely undertaken by him. The patient now is in a position to transact business and enter into society as well as any one ; but that part of the subject would be best left to the gentlemen who kindly acted as a committee in examining the case, and whom he could trust to supply any deficiencies in his report, while the remarks made by Mr. Hepburn at the last meeting rendered it unnecessary for him (Mr. Moon) to justify the, he feared, somewhat wearisome length at which he had detailed the case.

It would be noticed that he had not touched on the cause of the lesion, or on the constitutional treatment, as the latter fell under the care and was successfully carried out by Mr. Durham, and he would ask that that part of the subject might *not* be entered into that night.

The CHAIRMAN said they had heard the very interesting communication Mr. Moon had laid before them. They had also had an opportunity at the last meeting of inspecting the very clever and ingenious appliance which was used. He should be very happy to hear any remarks upon the subject.

Mr. VASEY said he had much pleasure in substantiating all that Mr. Moon had said with regard to this case. He wished, in the first place, to express their thanks to the patient. A poor patient came readily enough, being remunerated for it, but it was not often that they found a gentleman coming so kindly, and submitting to such an examination as they put him through, for the benefit, he might say, of science. He never saw a case of such extensive loss of substance so thoroughly, efficiently, and perfectly restored. He regretted those present on the last occasion were unable to benefit by an examination of the patient and the mouth, as he had done. He looked upon a case of the kind as throwing credit and honour upon their work. Of the many mechanical appliances made for the benefit of suffering humanity, he had never seen one which more commanded his admiration. It put him in mind very much of the important operations that surgeons perform. The surgeon enabled the lame to walk, the aural surgeon the deaf to hear, the ophthalmic surgeon the blind to see. In this case the dental surgeon had enabled the dumb to speak. Without the artificial piece the patient had no power whatever of articulating or making himself understood. He wished to express his thanks to Mr. Moon for giving him the opportunity of seeing such a case, and he was sure both he and Mr. Coles would at any time kindly give assistance and advice in any similar case that might come under the care of any other member of the Society.

Mr. OAKLEY COLES said he had simply to give as his contribution some details in the manipulation of the rubber pad. It was made in the ordinary way, in the first instance, of wax and gutta-percha. This was moulded in plaster. After trying at first type metal, he at last succeeded in obtaining the best moulds by means of zinc; for he found he could obtain the hardest surface, most perfect polish, and sharpest joints for articulation between the two halves by making them in that rather than in type metal. The under-cut was obtained by core-casting, and the whole surface thoroughly polished with pumice powder, burnished, and afterwards polished with a soft brush at the lathe. The pad was vulcanized six hours, and the one in wear was certainly very soft and velvety on the surface. The chief novelty in the treatment of this case was the fact that the pad was made entirely distinct from the gold plate. In this way the pad took the place of the water-bed to a patient with a bed sore, preventing any possible friction. If the pad had been fixed to the plate, then with every movement of the jaw there would have been a certain amount of friction between the pad and the remains of the upper jaw. The pad being detached from the plate, any movement of the plate produced friction between the plate and the pad, and left the contact between the pad and the jaw perfect and unmoved. These were the chief points of interest in his share of the treatment of this case.

Mr. VASEY asked whether he had rightly understood that there had been some difficulty in the use of ordinary swivels which had been overcome by the use of others.

Mr. MOON said the ordinary ones were not tried, but he believed they had gained greatly by using those devised by Mr. Henry Rogers. In the first instance, when their patient's prominent incisor tooth was present, and an artificial nasal septum was in use, it would have been very difficult to have taken the set in and out of the mouth without kinking the springs, if they had been mounted on ordinary swivels. He also believed that (with these swivels) lighter springs could be

used, on account of the even bearing which they maintained.

Mr. SEWILL asked why Stent's composition was used instead of plaster of Paris in taking the models. No doubt there was a very good reason for it, because he was well aware that those gentlemen who made these apparatus knew very well the much greater value of a model obtained from a plaster impression than one from a model in Stent's composition.

Mr. OAKLEY COLES said the parts to be fitted consisted mainly of hard tissue. The soft portion was the fore part of the mouth, and it was important that a material should be used which would exercise sufficient pressure to restore them to their natural contour, and that could not be done by means of plaster. The plaster would simply have gone up into the space, and they would have got a perfect impression of the mouth with the lip in a depressed condition. Using Stent's composition, they obtained an impression of the hard tissues, whilst, at the same time, the pressure that was necessarily exerted pressed forward the lip, and so gave something approximating to the natural contour of that feature.

Mr. CHARLES JAMES FOX exhibited a new articulating frame, and stated that as the inventor, Mr. Davidson, was present, and would explain it in detail, he would only say that, although it at first appeared complicated, it was found in practical use to be very simple and ingenious. He had for a considerable time used with great comfort a very simple form of bite-frame made by Messrs. Wood and Graham; but this one introduced by Mr. Davidson had recommendations worthy of their consideration, inasmuch as it was intended chiefly to save labour to the *operator*, and to enable him readily to shift any bite he might have accidentally taken inaccurately, into a different position.

Mr. DAVIDSON said when a dentist was in the operating-room it was very inconvenient to have to send the models out of the room to get the bite articulated with plaster. With

this new instrument, if the bite wanted altering in any form, it could be done by a very simple arrangement. By a ball-and-socket joint, the frame could be moved on an angle at the back, or the sliding bars at the back would rise up a considerable height, and so drop the bite down to the lowest depth they could require it in front. The models could also be moved without disturbing the ball-and-socket joint by means of side screens, while the arms could be drawn out and then fixed rigidly in position. One advantage was that the instruments were all manufactured exactly alike as to their parts, so that a model could be sent to a distance with only a piece of wax between, and the mechanician might place it in his machine and do the work instantaneously, without the trouble of re-making the bite in the wet plaster. He had tried it for nine months, and found it answered his expectations.

The CHAIRMAN said this was no doubt a very ingenious instrument. It was an immense saving of time to have an accurate bite. They all felt the discomfort and great tendency to irritability of temper that arose when the bites had not been accurately carried out, and to have an infallible method of getting a correct bite would be a great desideratum.

Mr. Fox said he had been asked what was to take place in the event of the parts of the bite being separated—how the operator was to recover his bite. He did not know whether Mr. Davidson had quite explained that.

Mr. DAVIDSON said it was supposed no gentleman would move the models unless he took a piece of wax and placed it between, so that he could put it back directly. If he wished to keep a register, all he had to do was to get a piece of plaster to go easily between the models, and build them up with wax, which would keep the models together.

The ballot was then closed, having remained open, according to rule, for the space of one hour ; and the scrutators, Messrs. T. F. R. Underwood and F. Canton, with the Secretary, retired to examine the votes.

CASUAL COMMUNICATIONS.

The CHAIRMAN said they had been promised two papers for that evening ; one by Mr. Fletcher, and one by Mr. Henry, of Hastings ; but Mr. Henry had kindly consented to reserve his paper till the next meeting, owing to the pressure of business before them. He therefore called upon the Secretary, Mr. Turner, to read the following communication from Mr. Fletcher.

The Tube-packing Test for Amalgams.

By Mr. THOMAS FLETCHER.

MR. PRESIDENT AND GENTLEMEN,

THIS test appears to be so little understood by the majority of experimenters that it will be well to attempt an explanation of the conditions necessary to make it reliable, and also to give some information as to the properties shown by it. One objection raised to this test is that, in a circular cavity with perfect sides, wedging is possible, such as cannot be done in irregular cavities in the mouth. This is undoubtedly a mistake ; wedging is only possible when either the wedge or cavity is elastic. When the plug is of the consistency of hard putty, without a trace of elasticity, wedging is simply impossible under any conditions. Further than this, I find experimentally that there is no difference in results in different forms of cavity, provided equal care is taken in each case.

The tube test, as I understand and use it, is as follows :—

Take two glass cups of from three-eighths to half an inch diameter, fill one of these partially

with water containing colouring matter, and pack into each cup a plug of the amalgam to be tested. The dry plug is intended to represent the conditions met with in packing a large plug in the mouth under favourable circumstances, where the rubber dam can be used; the other, to judge of results when moisture is present. These two plugs are to be immediately covered with coloured water or ordinary ink, and kept covered for at least two months before any fair estimate can be formed of the value of the alloy. Now as to proof of the value of these tests. The old form of amalgam known as extra plastic gave in my own hands singularly perfect results, with occasional total failures.

These failures I could not account for in any way by any known test, as the results differed most seriously with the same samples in the same mouth.

When I devised the wet-packing test, these failures were at once explained, as the alloy proved to be one which had not the power of retaining its form in a cavity to which moisture had access, provided the walls were not absolutely dry at the time of packing. Further experiment has proved that this peculiarity exists in many other alloys to a serious extent, and by the assistance of the wet packing test I have been able to remedy it perfectly, both in the extra plastic and the platinum amalgam.

Now I hold that the proof of this fault in plastic alloys, and also the discovery of means to prevent it, is owing to the use of the packing test alone, and that no other known test is sufficient to show what I am certain is the cause of most, if not all, of the failures with amalgams. When we compare the results of packing in cavities with wet sides with the results seen in the mouth, the perfect resemblance between the two is most striking; the raised plug and the parted margins so commonly seen being exactly reproduced. That this property is totally distinct from shrinkage is very easy to prove, as the tube test shows beyond a shadow of doubt that it occurs only in the presence of moisture, and that the parting of the edges is accompanied by a rise in their level.

It also occurs to a marked extent in an alloy which has been recently recommended to the Society on account of its expansion in setting, the amalgam in question having no power to retain its form in the presence of moisture.

When we compare the *apparent* shrinkage in some alloys caused by moisture interference with the *real* shrinkage of the worst alloys known, the latter sinks into insignificance, and it is evident, if comparative tests are any use at all, that under favourable conditions a better plug, as regards adaptation, can be made with an alloy with considerable shrinkage than with an alloy which fails to retain its form; the latter evil

being far the worst, although under favourable circumstances it can be perfectly met by the use of a water-tight varnish.

We have here a proof that the specific-gravity test alone is not reliable, as it does not show the most important property, and it is hard to see by what other than the tube test the cause of the lifting of amalgam plugs could have been discovered.

In some experiments detailed to the Society last session, two amalgams were mentioned as usually giving good results in the packing test, the best of these two being palladium, the other being the extra plastic. The difference between these two is, that the latter was slower in setting, and was therefore more subject to moisture interference. This slowness in setting is now remedied, and the irregularity of results has disappeared, and also the necessity of absolutely dry cavities.

Unless an amalgam sets with great rapidity, this absolute dryness appears to me to be essential to perfect success.

It will be well, perhaps, to exclude from this rule the curious compound of precipitated copper and mercury, which appears to be to a certain extent porous throughout the mass, and therefore does not alter in shape to any practical extent in the presence of moisture, certainly not to anything approaching what occurs in perfectly impermeable compounds. This porosity is a most objection-

able feature, as it entails certain discoloration of the cavity. I do not think any operator will question my assertion that discoloration occurs under a plug only when that plug fails to exclude moisture, and a packing test is therefore a necessity, both in judging an amalgam, and also in learning the best mode of using it successfully.

It is therefore hard to see why an opinion should have been expressed at a recent meeting, that the tube-packing test should be abandoned, as there is at present no other test which will give the same information. Under any circumstances it cannot be abandoned by makers, as it is the only known one which can be applied as a guide in melting and discarding imperfect samples, which constantly appear in the manufacture of all alloys, however simple their composition.

The recent revelation concerning the standard trial plates at the Mint is sufficient to show that nothing but the most rigid testing can insure anything like uniformity of results.

The two plugs sent are a pair from my ordinary ingot testing, and were roughly made along with a number of others. They are fair average samples, and are not selected in any way. No. 1 is the present quick-setting form of the extra plastic amalgam, and packed in a dry cavity. No. 2 is the same sample, packed in a cavity full of ink, the ink and amalgam being mixed up together. It has been objected more than once that I have

the art of packing to perfection, and, in reply to this, I can only say that the plugs in question were made along with about thirty others in a great hurry, and that all the art in the world would not make a plug fit to be seen under such conditions as those of No. 2, except with an alloy having special properties to make such a result possible.

Both these plugs were kept covered with ink from the time of their completion for a period of two months, and both could be matched under similar conditions in or out of the mouth by any ordinary operator.

Taking the two, I contend that the test is a fair one—amply severe,—and that it copies the conditions of the mouth more closely than any others. Further, I contend that the results shown here are a copy of those in the mouth in daily practical working. That these plugs were not made with any care can be readily seen from the irregularities, which can only be caused by careless packing; there is no difficulty in making absolutely faultless plugs, wet or dry, if necessary.

The CHAIRMAN said the scrutators having examined the balloting lists, informed him that the gentlemen nominated by the Council as officers of the Society were duly elected as follows :—

President.—Charles Vasey, Esq.

Vice-Presidents.—Resident : Samuel Cartwright, Esq. ; John W. Elliott, Esq. ; Edwin Saunders, Esq. Non-resident : T. R. M. English, Esq. (Birmingham) ; G. W. Buchanan, Esq. (Glasgow) ; Daniel Corbett, Esq. (Dublin).

Treasurer.—James Parkinson, Esq.

Librarian.—Thomas A. Rogers, Esq.

Curator.—C. S. Tomes, Esq.

Honorary Secretaries.—Henry E. Sewill, Esq. (Council) ; J. Smith Turner, Esq. (Society) ; J. Oakley Coles, Esq. (for Foreign Correspondence).

Councillors.—Resident : G. A. Ibbetson, Esq. ; Henry Moon, Esq. ; W. G. Ranger, Esq. ; Thomas Edgelow, Esq. ; Henry I. Barrett, Esq. ; Alfred Coleman, Esq. ; Charles West, Esq. ; E. B. Randell, Esq. ; F. G. Bridgman, Esq. Non-resident : G. W. Smith, Esq. (Manchester) ; Frank Petty, Esq. (Reading) ; J. E. Rose, Esq. (Liverpool) ; C. H. Bromley, Esq. (Southampton) ; S. Amos Kirby, Esq. (Bedford) ; J. Dennant, Esq. (Brighton).

DISCUSSION.

The CHAIRMAN then said they had listened to another practical and instructive paper from Mr. Fletcher, opening up many new points. One that struck him was the fact of the porosity of one (as regarded durability when properly worked) of their best amalgams, though perhaps in colour one of the worst, namely, the compound of mercury and copper. This was an important point, and bore a little upon the other question of the ink test for fillings. The question arose how far a small amount of porosity interfered with the durability of a filling; and whether, again, these very tests that were brought forward were tests of the permanence and durability of the fillings themselves. However, they were much indebted to Mr. Fletcher for a very interesting communication.

Mr. SEWILL said he was sorry to see Mr. Fletcher had omitted to state whether he used dichroic ink or ordinary ink. The difference between inks was well noticed by Mr. Charles Tomes. If they had an ink composed of solid particles in suspension, it was extremely difficult to make it pass through a fissure unless the fissure was wide, and, in fact, a test of that kind was valueless. One or two of the statements required to have more reason thrown upon them before he could accept them, especially those in which Mr. Fletcher said that a perfect filling could be made in a wet cavity. To refute that statement would be simply to explain what they knew about the pathology of caries, and that sufficiently showed that water was a very undesirable thing to leave around a filling. Especially was it undesirable where they had substances such as amalgams which were subject to a certain amount of decomposition in the presence of moisture and decaying organic tissue.

Mr. TURNER said the second specimen sent by Mr. Fletcher, of which he stated that the amalgam was mixed with the ink and then put into the tube, did not represent fairly the conditions which would exist if they attempted to do the same

thing in the mouth. If the fluid was mixed with the amalgam, it was no longer mixed with it as they saw it there ; it must have been turned out of the amalgam in some way or other : if not squeezed out by the pressure of the instrument used, it must have been squeezed to the surface by the gravitation of the amalgam itself. They could understand that in the mouth they would have moisture lying on a surface which would absorb it or retain it. Such was not the condition of the glass of which the tube was composed in which that experiment was made ; so that in that respect the conditions did not seem to be the same, and to his mind the difference was very essential. In the matter of ink, he believed it was Mr. Fletcher's opinion that ordinary ink, or even water, with colouring matter floating in it, not in solution, was a sufficient test and a fair representation of the saliva. He did not pretend to argue with Mr. Fletcher on matters chemical, but it seemed to him in using this test on a piece of bone or tooth, the colouring matter, if only held in suspension, might be filtered while the fluid was finding its way in between the walls of the cavity and the amalgam used. The more complex ink was the one which would most effectually test any amalgam. In the saliva they not only had colouring matter, or rather solid matter, floating, but they had a variety of substances, and certainly they had an acid condition, which was an enemy, if not to the amalgam, at least to the teeth into which the amalgam was placed. He did not quite understand Mr. Fletcher's reference to Sullivan's stopping. He agreed with the Chairman, that it was in many instances a most useful article. It could be used sometimes where it would be almost hopeless to use any other stopping, and cases were continually coming under the notice of people in practice where this amalgam stopping had been used in a rude, rough manner by the old-fashioned practitioners twenty, thirty, or forty years ago. Why it should be so serviceable and still be of this porous character he was at a loss to tell. Certainly it had some chemical action upon the bone with which it came in contact, for if they cut out an old Sullivan's stopping, they would find the tooth in contact with it to be hard, while below it it might be soft ; and this condition had been elsewhere noticed by Mr. Fletcher. He, as Secretary of

the Society, wished to thank Mr. Henry for the handsome way in which he at once consented to withdraw his paper that evening.

No other member offering to speak, the Chairman (Mr. Coleman) then rose, and delivered the usual Address on the close of the year, in the unavoidable absence, through illness, of the retiring President, Mr. John Tomes.

CHAIRMAN'S ADDRESS.

GENTLEMEN,—It is now my duty to endeavour to lay before you some account of the work accomplished by our Society during the past year. The most important of its objects, and for which it was especially founded, are its monthly gatherings for the communication of new facts and the mutual interchange of ideas. The number of papers read during the year, including that which we have listened to with much pleasure this evening, has been large, viz. ten,—large, that is, in proportion to the number of our Meetings; and if they have not attained that high standard which some have reached in regard to scientific merit, they on the other hand have been eminently practical, assisting the practitioner not merely in his daily work, but enabling him more largely to extend his sphere of usefulness to his patients. The first paper of the year was by Dr. Rottenstein, of Paris, and the subject, “Dentifrices.” In his historical sketch of the introduction and use of these, his paper implied a considerable labour of research. Some who discussed it seemed of the opinion that the subject was of a character scarce sufficiently scientific to be brought before a Society like this; but we must remember that Dr.

Rottenstein, in conjunction with Dr. Leber, has introduced a very important theory with regard to dental caries, in which vegetable organisms play a most important part, and that, consequently, the destruction or removal of these by any means forms a most important item both in the prevention and cure of that disease. Whilst happily in the present day we are not called upon to prepare dentifrices for our patients, it is still our duty to see that no compounds of a hurtful kind are used in them, and to occasionally prescribe with them agents which may correct or neutralize unhealthy conditions in the oral cavity.

For our next paper we were indebted to a gentleman not immediately within our own ranks. Dr. Woodman read us a paper on "The Occasional Occurrence of Symptoms of Poisoning, probably dependent upon the Colouring Matter of Pink and Red Vulcanite." The paper gave evidence of considerable pains the writer had taken in making himself well acquainted with the physical and chemical properties of the vulcanite used in the dental art; and, if the discussion and remarks on that occasion did not convince him that he had entertained erroneous views, it certainly went far to show that such cases were extremely rare, and probably only when very inferior rubber compounds were employed. The subject, however, is of very considerable importance, even if such cases occur only as units in

thousands, and so thought the Meeting in appointing a committee to report upon any cases which might be brought under its notice. That Committee has made at present no report; and I understand the reason is, only one case, obtained with great difficulty, has been brought under their knowledge, and that that case, even, hardly bears upon the question. The Committee is still in existence, and is endeavouring to obtain all the information it can upon the subject. Our thanks are due to Dr. Woodman for his care and professional feeling in preventing the question assuming a sensation form.

In April we were favoured with a paper typical of the year, in which Messrs. Ewbank and Charles Tomes gave us a record of some extremely interesting experiments they had made upon water-tight fillings, with substances most commonly employed for filling teeth, and under conditions similar to those which occur when these substances are introduced in the mouth. These experiments must greatly add to our knowledge, and enable us more readily to detect failures than heretofore.

At our May meeting we were favoured with a short but practical paper by Mr. J. E. Rose, upon an ingenious means for sustaining plates by atmospheric pressure, devised by an American confrère, Mr. Hall, and termed "Hall's Suction Disc." This was followed by a longer paper on matters referring

to the practice of dental surgery in Egypt; and although my name is attached, in conjunction with that of Mr. Waller, as the author of this paper, I trust I may, without the charge of egotism, venture to suggest that a series of such papers, if obtained from different parts of the world, would prove very useful, and go far to clear our knowledge upon many difficult and abstruse questions. Thus, for instance, with regard to dental caries, Mr. Waller, who has had very considerable opportunity for making comparison between the Bedouin of the Desert and the inhabitant of the Nile, gives it as his opinion that the great increase of dental caries in the latter is due to the introduction of alcoholic beverages, an opinion which could have had little value unless founded upon such opportunities for observation as Mr. Waller possesses.

The once much-condemned alloys of mercury and other metals, termed amalgams, have of late years been so carefully and scientifically investigated, that we have been able to discover many of the imperfections, both in their composition and in our mode of manipulation, which led to failure. Our attention was very forcibly directed to one of the most important of these, in a valuable paper contributed by an honorary member of the Society, and a gentleman of high authority as regards the nature and behaviour of metallic bodies. Mr. Makins—for it is to that gentleman I

refer—stated that he believed we might much more frequently employ the compound of palladium than we usually do ; which statement I would indorse, inasmuch as I have seen many cases in which those fillings remained perfect in the mouth whilst contemporary fillings made of other materials had long since disappeared.

Gentlemen, I am always sorry when the writer of a paper tells us that his paper has been written in compliance with a request. It implies a poverty of the Society, and as a rule such papers are seldom up to the average. As regards certain works so compiled, they have undoubtedly been below it. Happily, however, there are exceptions to every rule, and we were favoured with a good paper by Mr. Hutchinson, entitled “The Nerve Pulp in Life and Death.” It was written to evoke discussion, and in this respect was certainly most successful, but, perhaps in consequence, to a certain extent failed to give us so fully as we should have wished the ideas and views of the author. I would humbly suggest that in future, not always having a Mr. Hutchinson at hand, we depend upon voluntary contributions, and, these failing, fall back upon our casual communications, which I am convinced would alone support a Society such as ours.

The subjects brought forward by Mr. Hutchinson were very appropriately taken up, extended and discussed at the next Meeting by two papers,

one by Mr. A. W. F. Barrett, and another by your humble servant. I rather fear the latter, which was simply a record of certain modes of practice, may have divided attention, and so to a certain extent diverted it from the very excellent paper with which Mr. Barrett favoured us. And then, we have had this evening the valuable and practical paper by Mr. Fletcher, to which I have before alluded. Gentlemen, if I have devoted a considerable amount of your time to this portion of our work, it is because I know how large an amount of time is taken up in the preparation of these papers, and that we owe a very deep debt of gratitude to the gentlemen who have written them.

With regard to our casual communications, these have been this year especially interesting. They have dealt with a variety of subjects. A large number of valuable instruments and appliances have been brought before our notice; a large number of interesting cases, such as Mr. Moon and Mr. Coles have brought before us to-night, have also been recorded, as well as a large number of experiments; and I am sure we here must not forget the labours both of Mr. Fletcher and Mr. Amos Kirby in regard to the amalgams, tending so greatly to extend and make accurate our knowledge of these compounds, and which, if continued in the same spirit, I have every reason to hope will ere long produce us

one having the whiteness of Mr. Fletcher's, with the durability of the palladium. As I have stated, our work this year has been eminently of a practical character, and has, I trust, greatly advanced the time when, in speaking of ourselves, it will be said, "They actually extracted teeth, and without attempting to replace them, cast them away."

Second in importance to the subjects I have mentioned, stands that without which we could not long exist. I allude to the so-called "sinews of war," which, under the fostering hands of our able Treasurer, appear in a flourishing condition, and I feel sure will so long continue as he is willing and able to undertake an office which, while it reflects no great scientific credit, involves a very considerable amount of labour and time. To him, I am sure, our best thanks are due. You have heard the report of our Librarian, and the report of our Curator. They show that both our Museum and Library are in a flourishing condition. I can only wish for myself they were more used—the Library especially. We hardly know how much the Museum is used, and, in fact, perhaps few of us really know how much valuable information is contained in that most instructive part of our Institution. You will see also by the Treasurer's report that we are not only in flourishing circumstances as regards the so-called "sinews of war," but at the same time it shows a very satisfactory though not large increase of our Mem-

bers ; but I think, from the number of nominations to-night, we may safely augur that the new year has in that respect set in well.

If it be sad to have to chronicle the names of those who have passed from us during the year, it is gratifying to think that their memory still survives, and that though their place may be vacant, and the familiar face no longer seen, yet the deeds of good men survive their lives, and I venture to affirm that no member of our useful calling passes away from this sphere of usefulness, if he have faithfully discharged his trust, without leaving in the hearts of many beyond his own circle grateful recollections of his name and work. Amongst those I have to recall to you as having passed away from us, stands pre-eminently he who so ably filled this place last year. Mr. Edwin Sercombe was born in 1826, in the city of Exeter, where he received his general and professional education—the latter at the hands of an eminent practitioner still living, Mr. Norman King. He commenced practice in 1849, in Albion-street. In 1852 he removed to Somers-place, and in the year following became a member of the Royal College of Surgeons. From Somers-place he removed to 41, Brook-street, where he succeeded to the practice of Mr. Nasmyth, on the death of that gentleman. At the opening of St. Mary's Hospital he was appointed dental surgeon and lecturer on dental surgery, which post he occupied

for thirteen years. It was not very early in the history of the Society that Mr. Sercombe entered upon what might be called an active part in its affairs ; and the same may be said in regard to its younger sister, the Dental Hospital ; but when Mr. Sercombe did take up anything, such was his energy and determination, heart and soul went into the matter, and results followed upon one another in rapid succession. In his daily work his constant aim was thoroughness, and to which end he spared nothing. That such qualities should have ensured success is not to be wondered at, but, alas ! as is too often the case, they exhaust the frame which should support them, and it appears to give way to attacks that much feebler constitutions seem able to combat ; and such was his case. He died in the spring of last year. Men of great determination and fixity of purpose often give offence in their expressions of opinion. If Mr. Sercombe ever did so, we are sure that such was quite unintentional, and never premeditated.

Amongst country practitioners few, and deservedly, have ever held a higher position than did Mr. Thomas Gill Palmer, of Cheltenham, whose death occurred on the 12th of November last. From an obituary in the "British Dental Journal," I find he was born in London in 1811, and received his professional education at the hands of the late Mr. Parmly, at that time of London, and afterwards of New York. For a

short time he assisted that gentleman, and then commenced practice in Peterborough; he soon after moved to Cheltenham, where he conducted, until within a year or two of his death, a practice which became large and extensive. Mr. Palmer was a man much looked up to and confided in, and justly, by his patients, and greatly respected in his own town. If, as the article I chiefly quote from says, he “formed a high standard of professional work, and was not very tolerant to those with whom he came in contact,” I am happy to state there were exceptions to that rule, and that at times he spoke kindly of practitioners and of work he might very justly have criticised. He was a very regular attendant of this Society, for a country member, especially at its early Meetings; and although I believe did not favour us with any paper, yet on several occasions he sent us valuable communications. He was a member of the Council in 1858-9, and Vice-President in 1860-1-2.

Mr. E. P. Bromley was a son of Mr. Charles Bromley, of Southampton, and upon the death of that gentleman, in conjunction with his brother, Mr. C. H. Bromley, succeeded to his practice. He held for some period the office of dental surgeon to the South Hants Infirmary, and had to retire from practice in the early part of last year owing to ill-health; his death, we have to record, occurring at Weymouth, on the 12th of August last.

Gentlemen, like a child who picks the plums from his cake, and retains them for a bon-bouche at the last, so have I reserved till now the best portion of my feast. I am sure you will agree with me when I tell you I consider the greatest event of the year is our having been presided over by a gentleman of such scientific reputation, and of such great moral and social qualities, as the President whose period of office terminates to-night, and whose position I now so unworthily represent. I may state that, on his own behalf, Mr. Tomes most unwillingly accepted this office, and it was only when it was shown to him that he could serve the Society, and that by so appearing here he would most probably, which I believe has been quite the case, draw together again many of the veterans of our body, who naturally in advancing years prefer the comfort of the arm-chair to cold winter nights or heated rooms, he consented to accept it. The name of Tomes is associated with everything good connected with our profession that has taken place during the past quarter of a century ; of what that had been he gave us an epitome in an admirable address which we listened to with great pleasure in February last, an address only failing in this respect, that it did not show how largely Mr. Tomes himself had contributed to the success both of this institution, the Dental Hospital, and, as I say, everything good in the profession. He also failed to tell us one thing

more, viz., how in carrying out those great objects he made that greatest of sacrifices—his own health, without which all the enjoyments of life become as no enjoyments. He has presided over these Meetings with honour to our Society. He gave us a splendid gathering in these rooms, at our conversazione of last May, and I am sure would have been here every Meeting, had it not been for that unfortunate ill-health which has kept him away on the present and other occasions. I will not say more, because I am sure that there is a gentleman present who will do better justice to this subject, and will propose in more appropriate terms than I can command, the best thanks of this Society to Mr. Tomes for having again shown his devotedness to the cause at personal self-sacrifice in again undertaking the office of its President. All that now remains for me to do, is that which is most pleasing to me, in his name to thank the Officers and Council of the Society for the aid they have given him, and you, gentlemen, for the way in which you have supported him at these Meetings.

Mr. FLETCHER, in proposing a vote of thanks to the retiring President, said that he was sure they would all most cordially join him in according to Mr. John Tomes all the thanks due to his devotion to their cause, and especially for his kindness, urbanity, and disinterestedness. They must all regret his absence from them that evening, and he hoped that their hearty thanks would give him pleasure. Having called on Mr. Tomes two days ago, he was glad to be able to tell them that he was progressing towards recovery, though slowly. He felt that no eulogium of his could add to the deserved thanks of the Society towards their retiring President, Mr. John Tomes.

Mr. RYMER seconded the resolution. He considered that Mr. Tomes's presidency for the second time had shed a lustre upon the Society, and he hoped he might be spared in a green old age to preside yet a third time. Mr. Tomes's distinguished scientific works were an imperishable record as to his perseverance, as well as his high and great attainments. It was with peculiar pleasure that he seconded this resolution, because they were now in the twentieth year of dental reform. It was very nearly twenty years since there were two associations formed. He (Mr. Rymer) took a somewhat prominent part in one of those societies, and his views differed somewhat as to the best means of attaining that which they all wished to see, namely, the elevation of the dental profession, from those of their distinguished President. At that time, although he had no doubt whatever as to the high and honourable principles of action which actuated Mr. Tomes, he must confess that, not knowing him personally, he thought him somewhat illiberal ; but subsequent events had clearly shown that, so far from being illiberal in his views, the very reverse was the case, and that Mr. Tomes was as generous in his heart as he was wise in his head. He trusted their retiring President would very shortly be restored to health and strength, and that he might

live to be revered and respected to the end of a long and honourable life.

The resolution was carried by acclamation.

Mr. MUMMERY proposed the thanks of the Meeting to the Officers and Council of the Society who had so efficiently fulfilled their duties during the past year. He felt persuaded that that was a resolution which would also be carried by acclamation. (Applause.)

Mr. JAMES PARKINSON said, as senior officer of the Society, he must return the united thanks of the Officers and Council for the vote which had been passed. He was sure the same spirit actuated them all, namely, to do the best they could for the Society and the profession generally. If their services met with the approbation of the members, that was sufficient reward for anything they had done.

The CHAIRMAN then, on behalf of the Society, thanked the author of the paper read that evening, and also those gentlemen who had brought forward casual communications. He announced that at the next meeting they would be favoured with a paper from Mr. Henry, of Hastings, entitled "The Conservative Treatment of the Dental Pulp *versus* Devitalization.

The Society then adjourned.

Financial Statement, 1874-1875.

[illegible]

TOTAL ASSETS OF THE SOCIETY, OCTOBER 31ST, 1875.

Total Receipts for the year 1874-75	£418	4	2	Stock invested in New 3 per Cents	£815	7	2
Total Disbursements ditto	364	15	3	Deposit Note	200	0	0
				Cash at Banker's	195	7	2
Balance per Receipts	£53	8	11	In Treasurer's Hands	49	13	11
					£1,260	8	3

January 3rd, 1876.

Examined, and found correct,
{ T. F. R. UNDERWOOD,
{ CHARLES WEST.

STATEMENT OF DEATHS AND RESIGNATIONS OF MEMBERS, AND
NEW MEMBERS ELECTED DURING THE YEAR 1874-75.

Number of Subscribing Members (Resident)	87
" " " " (Non-resident).....	158
" Honorary "	25
" Corresponding "	21
	<hr/>
	TOTAL..... 291
	<hr/>

	Resident.	Non-Resident.	Honorary.	Corresponding.	Total.
Deaths .....	...	1	...	...	5
Resignations .....	...	7	...	...	7
Members Elected.....	7	8	2	1	18
" Re-elected..					
" Lapsed					

OCTOBER 31ST, 1875.

Number of Subscribing Members (Resident)	93
" " " " (Non-resident).....	157
" Honorary "	27
" Corresponding "	22
	<hr/>
	TOTAL..... 299
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GENERAL MONTHLY MEETING.

February 7th, 1876.

CHARLES VASEY, Esq., PRESIDENT, IN THE CHAIR.

The minutes of the last meeting were read and confirmed.

The following gentlemen, non-resident, were nominated for membership :—

Mr. EDWARD BINNS, L.D.S., 70, Linthorpe-road, Middlesbrough.

Mr. EDWARD READING, 117, Castlereagh-street, Sydney.

The following gentleman was elected resident member :—

Mr. J. H. WATFORD, L.D.S., 37, Cavendish-square, London.

The following gentlemen were elected non-resident members :—

Mr. WM. HENRY MALLETT, 1, Bedford-crescent, Exeter.

Sig. LUIGI MARTINI, Via-di-Po, Turin.

Mr. GEORGE ROBINSON, Douglas, Isle of Man.

The following gentlemen, having signed the obligation book, were admitted members :—

Mr. ALEXANDER CARTWRIGHT, M.R.C.S., L.D.S.

Mr. THOMAS GADDES.

Mr. CHARLES TOMES, in announcing the contributions to the Museum, said Mr. Saunders had presented a considerable number of specimens. Some of the most instructive were a series of lower jaws which had been cut in sections in various directions, so as to show the relations of the teeth to the alveolar processes. There was also a plaster model of the head of a micro-cephalic idiot, which showed very well the great slanting of the lower jaw and absence of chin which characterized those idiots. Mr. Gain, of Bath, had sent a specimen of phosphorous necrosis of the lower jaw, removed after death, and also a dilacerated tooth. Mr. Brand, of Exeter, had sent the pharyngeal teeth of a large Indian fish. From Mr. Harding had been received a specimen of salivary calculus, and some upper teeth excessively worn by mastication and friction of the lower teeth. Mr. Charles Rogers had presented them with models of a supernumerary tooth occurring in both dentitions, five incisors in the temporary, and five in the permanent series. Mr. Stocken had sent a specimen of geminated teeth, and Mr. Clifford Eskell a large dried dissection of an upper extremity, showing the distribution of the nerves and the vessels.

Mr. COLEMAN said : Having been recently asked if he adopted any plan for registering his cases, he had promised to bring before the Society a method he had employed for some fifteen years, and which occupied a few minutes only at the end of each day. The plan was based upon that pursued by Mr. Tomes when he collected his valuable statistics published in his works on the relative frequency of the teeth to caries, &c., but he (Mr. Coleman) made the little squares to represent the teeth themselves, and marked upon them the exact spots and relative sizes of the carious portions. Abbreviations were used for the materials employed in filling, or to designate the nature of the operation. The book had become expanded into a day-book, and two money columns followed the spaces representing the teeth ; the first ought really not to exist, it was there to record fees not paid at the visit, the second those paid at the visit. On the opposite page was a space and three money columns. In the first column was entered all expenses due on that

year; in the second, expenses extending over more than the year; and in the third, general expenses, which would be classed as private ones,—proportionate rent, living, &c. A diagram to which he referred illustrated those points. Another matter he wished to bring forward was probably of greater interest to the Society. At his request, Mr. Merson, the House Surgeon of the Dental Hospital, had kindly carried out twelve experiments in the application of the pepsine paste which had been introduced to their notice from time to time by Mr. Oakley Coles. Though Mr. Merson had endeavoured to follow as carefully as possible the directions of Mr. Oakley Coles, he was quite willing to admit that he might not have carried out the details as Mr. Oakley Coles thought they should be, and that might account for the results not being so favourable as could be desired. The pepsine was made into a thick paste with glycerine, and slightly acidulated with dilute hydrochloric acid. Prior to that the cavities of the teeth were either syringed or mopped out with tepid water. The pepsine was taken up on a pledget of cotton, and thus conveyed to the tooth, and finally covered over with cotton containing a solution of mastic. Of the twelve cases,—in three the teeth became so painful that the patients urgently begged their removal, which was complied with. In three others, in which the application had remained in the teeth forty-eight hours, pain more or less severe and intermittent had been experienced. In removing the dressings the condition of the pulps appeared precisely the same as before the dressing was applied. The teeth were redressed and again examined after a further twenty-four hours, but the condition the pulps presented in regard to discharge, &c., was apparently in no way improved. In the remaining six cases the pepsine dressing was allowed to remain undisturbed for five, six, and seven days. These patients did not complain much of pain, but as far as could be ascertained there did not appear any improvement either as regarded the amount of the discharge, or a more healthy condition of the pulp. The cases were all such as he (Mr. Merson) would have regarded as favourable for destruction by arsenic, which he preferred employing in connection with carbolic acid, occasionally adding acetate of

morphia. Mr. Merson admitted that he might not have applied the agent in precisely the same manner as directed by Mr. Oakley Coles, and if so he would be glad to try a further series of cases with the pepsine.

The PRESIDENT said no doubt the diagram shown by Mr. Coleman for registering work done was very useful, but when he (the President) had to collate some thousands of cases at St. George's Hospital, he found that the labour of extracting the details was extremely great, and at last he made an improvement which saved him a great deal of trouble. Instead of the thirty-two spaces for every patient, he adopted only eight. He had two columns, in one of which he put a letter for upper or lower, and in the other right or left. On going over some thousands of cases a second time from this improved register, he had the uppers and lowers and rights and lefts ready to hand in columns, instead of having to take them out of thirty-two spaces.

Mr. STOCKEN exhibited a model register. In early days he had found that regularity in the numbering of models required some little care and attention, but by adopting the form now shown, he had all the facts concisely before him, and could refer to them at any time without trouble. The book was in shape like a cheque-book, so that the particulars were written out in duplicate. One half could be given to the assistant. There were seven columns for the consecutive number of the model, the colour, number, the date, the material, the teeth (represented by letters), the upper and lower jaws, the kind of teeth to be used, the day and hour when they were to be tried in, &c. The assistant, on receiving this, could prepare it as required.

The PRESIDENT said a great many inquiries had been made respecting the health of their esteemed friend Mr. Tomes, and they would all have as much pleasure in hearing as he had in stating, that he was very much better, and that as the summer time came round they might hope to see him amongst them again.

Mr. OAKLEY COLES wished to make some statements with regard to the communication made by Mr. Coleman. First, he desired to know somewhat more precisely the character of the cases in which the pepsine was used ; and then to point out that the cavity should not be wiped out or syringed with water, but with dilute hydrochloric acid. The pepsine should be put in solid, and not on wool, and instead of sealing it up with mastic in spirit, it should be sealed up with wax, as the presence of the spirit to some extent counteracted the action of the pepsine. He was exceedingly obliged to Mr. Merson for having undertaken these cases, and only regretted that though the material had been before the profession for more than two years, no previous report had been made upon it. He trusted that this would be but the first of a series of reports by the officers of the Hospital on all therapeutic agents brought before the profession.

Mr. COLEMAN said Mr. Merson desired him to say that he was very much obliged to Mr. Oakley Coles for his explanations, and would be glad to try another series of cases in precisely the manner described by Mr. Coles, and report to a future meeting.

Mr. UNDERWOOD, referring to Mr. Rogers's models of supernumerary incisors, said some years ago he had a somewhat analogous case. A child had three perfectly well-formed central incisors in the first set. When those teeth were shed, he was astonished to find there were three perfectly well-formed permanent central incisors erupted, the peculiarity of the case being that one was turned round, presenting its side to the front of the mouth. He elected to remove the one at the side, trusting to mechanical agency to turn the twisted one into its place. They were upper teeth.

PRESIDENT'S INAUGURAL ADDRESS.

GENTLEMEN,—By your unanimous suffrages you have conferred upon me a distinction among you that I value more highly than any academical or social honour possible in my position to attain.

The respect of one's professional brethren I hold in the highest estimation; it is a crowning reward to any career, and worthy the ambition of any mind to gain; I therefore, with heartfelt pleasure, thank you for the mark of confidence you have displayed towards me by placing me in this chair. The distinction I have not sought, in the ordinary acceptation of the word; given as a proof of your approbation and regard towards me, I value it in the highest degree.

Up to the beginning of this century our profession held but a tenth-rate place in public estimation. John Hunter, in his treatise on the teeth, said, “In order that the reader may perfectly understand what follows, it will be necessary for him previously to consider and comprehend the anatomy and uses of every part of a tooth. Without such previous study, the Dentist will often be at a loss to account for many of the

diseases and symptoms mentioned here, and will retain many vulgar errors, imbibed by conversing with ignorant people or by reading books in which the anatomy and physiology of the teeth are treated without a sufficient knowledge of the subject."

In his time our profession appeared before the world principally through the medium of the charlatan, mountebank, and advertising fraternity, whose sole aim was the transfer of the contents of others' pockets into their own, who have left us no other inheritance than the history of their doings and the evil of their example, the contagion of which is still among us. In the midst of this evil crowd, however, a small stream of better men existed, who possessed the true spirit of professional life, and who sought to honour their calling; men whose example may be taken as the seed of the fruit this century has produced, exemplified in the life and work of such as Fox, Bell, Naysmith, Salter, Cartwright, and Tomes, bringing us up to the year 1857, when great general progress was discernible, and found expression in a general desire for professional organization.

Under the chaotic circumstances that then existed, every proposed movement was necessarily one of considerable uncertainty, and without doing any sort of injustice to either one or other set of opinions, we may honour in our hearts

those who took the initiative and the risk of stepping to the front.

Among the very foremost of these I place the name of Lee Rymer, who called the first public meeting together, and to whom is due the credit of beginning the first public organization of the Dental profession in this country.

Much mental and physical work patiently and freely bestowed resulted in the formation of the Odontological Society of Great Britain. I have had a somewhat large experience of our profession, and I am delighted to say a rather extensive personal acquaintance with those who form it. I have given thought and study to the subject, and I have come to the conclusion that the objects for which our Society was constituted were just those calculated in the highest degree to benefit our profession. I am free to express this opinion strongly, because it is no child of my brain ; I was not one of its founders, I was only one of the invited members.

In other professions the higher members depend in a great measure on the patronage of the lower. The physician is called in consultation by the general practitioner, the counsel's opinion is sought by the solicitor, &c.; but in ours each member stands alone. Any original mode of practice, or valuable application of skill, when made public, places all on an equality as regards its advantages. It would, therefore, almost seem

to be to our individual interest to cultivate a strict exclusiveness.

Under such circumstances, the formation of a society for the encouragement and diffusion of knowledge in dental surgery, and for the promotion of intercourse among members of the Dental profession was, to my mind, an act of high chivalrous patriotism. The aim and object being the exaltation of every one to a creditable professional standard, an example in honourable contrast to the selfish apathy of those who would appropriate everything and reciprocate nothing, or to those who, by their selfish reticence, publish their unsympathetic indifference to either the diffusion of professional knowledge, or to the extension of friendly intercourse among their professional confrères.

There can be no doubt that through the influence of our Society a professional spirit is fostered in our ranks, a feeling of emulation raised, and a desire created to be distinguished by high-class attainments. Three of our members are Fellows of the Royal Society, one is an Oxford graduate, one an M.B. of London, one has obtained by examination the highest surgical qualification, and we have a second Fellow of the Royal College of Surgeons by examination on our proposal-papers. But, better than all these, we have now in the ranks of the profession 350 who possess by examination an honourable dental qualification,

the only one, in fact, to be obtained in this country that can give any real dental status to the possessor; and it is a qualification stamped by the approval of, and granted by Royal Charter through, the Royal College of Surgeons of England, the most exalted surgical college in the world. These are proofs, I think, good and true, that we fear not now having our dental knowledge tested by the ordeal of an examining board.

Shade of John Hunter hearest thou this.

There is one great purpose to be served by our Society that is lamentably overlooked by the majority of the profession.

If we shut ourselves in the privacy of our own rooms, attending only, like tradesmen, to the wants of those who call on us, touting for more customers by cards, circulars, hand-bills, and newspaper advertisements, we assume the position only of handicraftsmen, and to ask for legislative interference under such circumstances is simply to ask for a trade monopoly, which in the present day no statesman dare entertain. If on the other hand, through the agency of this Society, especially if supplemented by branches in our large seats of learning and population, such as Edinburgh, Dublin, Glasgow, and Liverpool, &c., we can show to the world we have the spirit of professional men, that the practice of our art requires special study, and should be tested by

examination before being exercised on the public, legislative recognition would necessarily follow, not as a favour to give dentists a monopoly, but as a duty to protect the public from the ignorant pretensions of the unqualified.

I have heard it said that country members and visitors at our meetings have often felt themselves but coldly received. I know the general feeling here to be that as members they are entitled to all the privileges of the Society, and to press attention on them would savour of patronage, at all times offensive to gentlemen meeting on terms of equality. In a Society, however, founded for the encouragement of intercourse among the members of the profession, I think we had better err on the side of cultivating, rather than on that of neglecting this duty. No profession is so much in need of friendly intercourse as ours. All our successes are principally known to ourselves. Our failures go from us, and are seen by others. We therefore cannot too carefully guard against thinking too highly of our own doings, or against depreciating the work of others.

There is a law of the Society granting a privilege to members, which has seldom if ever been exercised; it runs thus: "Any member may make suggestions to the Council regarding changes in the laws, by letter addressed to the secretaries." We now form the Odontological Society of Great Britain, yet by law 18 the President must be

elected from the London members. I could name in a breath half a dozen non-resident members, whose elevation to the chair would do credit and honour both to Society and profession. Suppose during the next year the secretaries were to receive 250 letters suggesting a change, how evidently strengthened the Council would be in proposing any such liberal measure.

Allow me also to remind you of the law that leaves it to the discretion of the President to continue the discussions when of peculiar interest, after half-past nine. This cannot be done without curtailing the time for friendly intercourse; so, if at any meeting I seem disinclined to prolong the discussion beyond the ordinary time, it will be on account of my anxiety that the Society's mission may be faithfully fulfilled, and that science does not absorb too great a proportion of the time of our monthly gatherings.

In conclusion, I hope and trust that with your united assistance, during my year of office, I may be enabled to advance the objects for which our Society was founded—objects that I sincerely believe, if fully carried out, would do honour to ourselves, honour to our calling, and even to our country.

*The Conservative Treatment of the Dental Pulp
when Exposed versus Devitalization.* By
Mr. GEORGE HENRY, L.D.S.

MR. PRESIDENT AND GENTLEMEN,

As some remarks I made in the discussion at our November meeting may fairly be construed into a protest against the practice of devitalizing dental pulps, based on an abstinence from the use of arsenious acid, or any other destructive escharotic for the purpose of destroying vital pulps, for the last three years; and, observing how many bearings on the question were involved, and that my crude and unprepared observations ill-conveyed my matured convictions on this important subject, I have gladly accepted the invitation of our Secretary, Mr. Turner, to read a brief communication defining my views, deeming it at once a privilege, a pleasant duty to the Society, and a satisfaction to myself.

At the outset I must crave indulgence, for I have little that is new to present for consideration, unless it be a certain success in carrying out an old cherished principle—"the conservative treatment of the pulp in health and disease"; and this—unlike most of the contributions I have met with on the subject—without reserving any justification for the practice of destroying the tooth pulp.

I purpose first to enumerate some reasons for our best efforts in preserving the dental pulp; secondly, to express objections to the practice of devitalizing pulps, with stress upon the use of arsenious acid, the most approved agent for the purpose. I shall then describe concisely my treatment of exposed pulps, be they healthy or suppurating, with typical cases, and conclude with kindred observations, commending the matter to your consideration for what it is worth.

It will be no part of my subject to trace the progressive pathological steps towards "exposure," nor to treat on the physiological characteristics of the pulp. These have been so graphically portrayed in our standard dental works and in previous papers read before the Society, that I may, without further introduction, proceed as indicated.

Why should we aim at the Conservation of the Dental Pulp? Of first importance is the fact that its functions are not completed with its elaboration of the dentine, but they are continuous through life. The pulp, the chief source of nutrition to the tooth, has an intimate structural connection with the dentine by means of multitudinous nerve-filaments radiating from the odontoblast layer, and traversing the entire body of the tooth; destroy this connection, and we sacrifice the vitality of the dentine. The healthy pulp, by virtue of its dormant developmental power,

resists the intrusion of caries, or, to quote from Mr. Tomes's "Manual," "The stimulus or irritation transmitted to the pulp starts afresh the process of calcification in that organ"; and by this same process, the pulp cavity of sound teeth in advancing life becomes almost obliterated. The building up of a tooth is, therefore, a life-long process, and an all-wise purpose is frustrated by the needless destruction of this central power. Moreover, the presence of the pulp governs the healthful appearance and colour of a tooth; and who amongst us has not heard the expression in reference to a tooth deprived of the pulp—"It feels like a dead tooth"? Its looking like one is too often palpable, as must be acknowledged by all; and this is doubtless due to the disorganized contents of the dentinal tubuli, notwithstanding careful fang-filling.

I advance these elementary reasons for preserving the pulp—though they must be familiar to all—simply to support my individual effort in preserving diseased pulps, and to stimulate to a greater sense of the responsibility devolving on the dental surgeon to exercise his utmost skill and patience in preserving so valuable an organ when threatened by disease, and in rescuing it when attacked; for truly the dental pulp is as the *medulla* to a bone, or the pith to a tree.

But, if the practice of devitalizing pulps can fairly be supported by results, what is the parti-

cular pathological condition which renders such treatment necessary or compulsory? I admit it has hitherto been the last alternative of those who treat the teeth in a truly conservative spirit; but are there not many who regard the smallest exposure as a warrant for resorting to destructive escharotics — ay, who even expose a pulp, with the intention of its more certain destruction, and others who, confronted by an irritable pulp, for lack of knowledge how better to treat it, consign the entire pulp to destruction?

We have only to turn to the discussion at our meeting in November last to see that the advocates for the use of arsenious acid for destroying the pulp are far from unanimous as to the pathological condition demanding such treatment; and, in quoting the opinions of gentlemen justly eminent, I trust my motive will not be misunderstood. For instance, Mr. Kirby “never applied arsenic without cutting off a portion of the surface of the pulp with a small spoon excavator.” This vital condition of the pulp, admitting of such excision, to my mind implies one amenable to conservative treatment. At any rate, the treatment I am about to advocate would undoubtedly save such a pulp. One of the earliest pioneers of the conservative treatment of the pulp—by capping this organ—Mr. Thomas A. Rogers,*

* *Vide* “Transactions of the Odontological Society,” 1856-57, vol. I.

still holds the opinion "that when suppuration of any part of the pulp had been set up, it was necessary to destroy the whole pulp." But, as far as I am concerned, this suppuration of the pulp has long ceased to be a formidable barrier to its conservation, as I hope presently to show in typical cases.

Mr. Coleman "employed arsenic as an antiseptic in certain difficult cases where only a small portion of dead pulp remained in the fangs," such condition in his estimation meriting conservative treatment; but I cannot help thinking most operators would prefer to remove such dead remains by means of a barbed extirpator and syringing, rather than illustrate an undoubted antiseptic property in arsenic, it having the more serious and important property of destroying vitality, and its fluidifying action and consequent risk of spreading through the apical foramen of a tooth, rendering its use dangerous, especially in young persons. Through the postponement of my paper, I have had the pleasure of reading that of Mr. Coleman in the "Transactions" for December last, and the case he cites in reply to a question as to the preference for his treatment with arsenic to that of extirpating dead pulps and fang-filling, has certainly surprised me; his conservative efforts having reached the point of preserving absolutely necrosed teeth—so far decomposed, that a slice of the tooth itself would be

found to be in a putrid condition.* I have always held the extraction of such teeth to be sound practice, and with due deference to Mr. Coleman's great experience, I still fail to realize that the power of arsenic to arrest decay and putrefaction in tissues can be advantageously availed of in connection with the teeth. My own treatment presented another phase in the November discussion, and was intended to represent total abstinence from the practice of devitalizing dental pulps.

But, it was asked of those gentlemen who opposed the use of arsenic, "What evil results had followed its use in their experience?" Of course, looking at the destruction of the pulp as an evil, I object to the use of arsenious acid for this avowed purpose. In the next place, considerable suffering often attends the action of arsenious acid on the pulp; and, to show the uncertainty in this respect, I may quote from Mr. Woodhouse's valuable paper on the treatment of the pulp,† in which he says, "If the pulp has decidedly begun to waste, you may promise your patient very little suffering; but, if it is nearly perfect and healthy, it is safer to make no such promises." Again, have not many pulps been unintentionally destroyed through the application

* *Vide* p. 70.

† "Transactions of the Odontological Society," vol. V. New Series, p. 205.

of arsenic for obtunding sensitive dentine, so that now the generally accepted course is to reject its use entirely for this purpose. Has not defective manipulation in applying this powerful irritant poison and fluidifying caustic to exposed pulps frequently been followed by painful and serious consequences through its accidental contact with the gums and adjacent structures? Is there not abundant testimony to the fact, that consequent on the destruction of the pulp with arsenic the value and durability of a tooth have been greatly limited? Nor can we ignore the extreme difficulty in some instances of removing all disorganized remains, which, when left behind, incur the danger or annoyance of chronic gum-boils, which have been designated "safety-valves," but are really "vents" of an offensive and objectionable character. I cannot refrain—at this point—from quoting from a most interesting paper by Mr. Underwood—the first I ever heard read on the treatment of the pulp, in April, 1857.* Referring to the immediate and unmistakable effect of arsenic, Mr. Underwood says, "The tooth which but yesterday was the seat of the most excruciating pain, is to-day literally a dead substance in the mouth; but, if we wait a day or two after the tooth is plugged, we find that the periosteum which covers the fangs of the teeth is

* *Vide* "The Quarterly Journal of Dental Science," vol. i. p. 101.

affected.” Further on he says, “ I do not go the length of some writers, who lay it down as an axiom, that we must on no account use this agent ; but I do say, that in the great majority of cases where it is employed, in a few months’ time we have periostitis, the plug has to be removed, and in all probability ere long the tooth shares the same fate.” I must, however, content myself with referring those gentlemen specially interested in contemplating the dark side of arsenic, to the paper itself.

In connection with this part of my subject, one point—on which I think all are agreed—seems to assert itself, and should act as an additional stimulus to conservative effort, that is, the fact that cases of complete death of the pulp are the most treacherous to treat ; and I hope to win others to consider that disorganized pulps presented for treatment, through the timid procrastination and long-suffering of patients, are numerous enough, without our voluntarily adding to the number.

Presuming sufficient evidence has been adduced to show the desirability of avoiding the use of arsenic in our treatment of the living pulp, I hasten on to describe my treatment ; prefacing this with a few words as to the most suitable material for capping or protecting exposed pulps, and the chemical agent best adapted for restoring and preserving the same, in my experience.

After trying most of the materials * recommended for protecting the pulp, I have come to the conclusion that pink bibulous paper answers our purpose better than anything else, for the following reasons :—It is non-metallic ; its softness and flexibility, when moistened, enables us to adapt it with precision ; its absorbent property serves to retain an approved antiseptic application ; it is easily placed *in situ*, and the pink colour is a help to correct adjustment in difficult situations.

Other materials may doubtless be employed with good results, but anything of a stiff nature, or that cannot be accurately adjusted, I believe must necessarily be an imperfect protector, and that bridging over a pulp is a mistake, since the slightest air-vacuum or atmospheric contact is favourable to septic influence, and therefore a hindrance to success. For this reason I cannot agree with Mr. Hutchinson's plan† of burnishing the leaden cap he employs into a saucer shape, with the object of allowing the force to be spent on the lead and not on the nerve, as this is calculated to press in a minute quantity of air, sufficient to endanger permanent success ; besides which, in my experience, anything metallic as a protector in contact with the pulp is contra-indicated.

* For list of these materials, *vide* paper by Dr. Stellwagen in the *Dental Cosmos* for March, 1873.

† Present vol. p. 20.

With regard to the chemical agent most valuable to us at once as a coagulating caustic and a powerful non-irritating antiseptic,—having tried nitric acid, chloride of zinc, nitrate of silver, creosote, and carbolic acid,—I find the last-named alone meets all our requirements without drawback.

Nitric acid has proved, in my hands, too corrosive and difficult of application to an exposed pulp, without running the risk of undermining the stability of the adjacent dentine. Chloride of zinc produces intense pain and suffering when applied to an exposed pulp; at the same time, the free acid in the oxychloride is valuable in obtunding the sensitiveness of the dentine around the capping employed, without risking the loss of vitality beyond, as does arsenious acid. Nitrate of silver stains the teeth. Creosote has its unpleasant side, and is less valuable than the purer preparation of carbolic acid. I have tried the pepsine paste and salicylic acid for the sake of their antiseptic property, but my success with carbolic acid has been so uniformly satisfactory, that I look upon it as the most valuable agent we can employ; believing that it converts the suppurating surface of the pulp into a healthy one, and promotes a normal action beneath the blanched film; how else can we account for the permanent comfort secured to teeth correctly treated with it? No doubt an explanation is to

be found in the different action of carbolic acid “under cover,” and when under atmospheric influence.

I believe this to be a most important and interesting subject, demanding closer investigation; our knowledge as to the nature of the white film produced by carbolic acid, and its eventual changes “under cover” being far too obscure. We do not appear to get a true eschar in the sense of that produced by nitrate of silver or nitric acid; there is no dry slough, crust, or scab, which separates from the healthy tissue; and I would draw attention to the fact that we often see the mucous membrane accidentally blanched when applying carbolic acid to teeth, an appearance identical with that produced with the ether spray, and in neither case is there any slough or destruction of the surface, but in a few minutes the part resumes its normal appearance. In each, there would appear to be a temporary coagulation of the albuminous or fibrinous element in the part affected. The question arises: Is the theory of an insoluble layer correct? I personally believe that we have a valuable temporary coagulation in the one case equivalent to the congelation in the other—both subsiding gradually under healthy vital action. But I can only thus advert to a subject, which I trust will soon meet with clearer elucidation at the hands of some more competent member of the Society.

In order to render this paper complete, I must detail my treatment in an ordinary case of exposure, and by exposure I mean a pulp so actually visible and uncovered, either by accident or the intrusion of caries, as to be under the septic influence of decaying matter, or the fluids and atmosphere of the mouth. To be brief, we will suppose that in preparing a cavity on the mesial surface of a first lower molar, the pulp has been needlessly but accidentally exposed, and perhaps punctured. If pain be occasioned, this is readily alleviated with one of the favourite anodynes, such as aconite and chloroform, camphorated chloroform, or, better still, carbolic acid. The cavity finally prepared, a small pledget of wool charged with carbolic acid is kept in contact for from five to ten minutes, according to the extent of the exposure; for if the puncture is only sufficient to cause a slight bleeding, it will not be necessary to bare the pulp, but if a visible exposure has to be dealt with, this should be positively blached, and so prepared for innocent contact with a protecting layer. This layer, consisting of a small circular or oval bibulous pad, moistened with carbolic acid, is carefully adjusted in juxtaposition with the blached pulp, overlapping the aperture about half a line or more. This done, a few seconds suffice to mix the osteo, arranged ready to hand on a glass palette. Insert the same without undue pressure, hollow it out, and trim the edges, undercutting

for the permanent metallic plug, which may be inserted as soon as the osteo has firmly set.

When disease has accomplished the work of a simple exposure, the treatment will be almost identical, apart from the previous existence of toothache, which would involve temporizing. In such a case the odontalgia would be relieved locally by a selected anodyne dressing protected with mastic, the gums painted with iodine and aconite, and in inflammatory cases an aperient prescribed.

Thus far, many are accustomed to practise almost the same operation under similar circumstances. But, I ask, has this plan been consistently carried out with diseased pulps, to which I consider I have proved it to be applicable in practice?

I will now describe my treatment of a suppurating pulp; and it is satisfactory to know "that the suppurative process"—I quote from Wedl's "Pathology"*—"is almost always developed as a sequence to caries, and is limited to the superficial layer of the body of the pulp or of the root portion corresponding to the carious locality." This condition ascertained, I remove all trace of decay, and then syringe the suppurating surface of the pulp with carbolized warm water, which soon reveals to what extent the pulp has suffered.

* "The Pathology of the Teeth," by Carl Wedl, p. 179.

The next point is perhaps the most important that I have to urge, since to its omission may, I believe, be traced the numerous failures which are deplored by all who have earnestly desired to preserve such pulps, but have had to seek refuge in devitalization. This next step, which may be best understood by studying figs. 1 and 2, is to cut down the surrounding walls of dentine, represented by the dotted line, so as to be on a level with the surface of the pulp, which may in all cases be accomplished with suitable sharp spoon excavators, and that invaluable aid, the burring engine, so securing the direct apposition of a temporary carboic acid dressing. This I have rarely to renew more than twice, at intervals of a few days, governed by the perfection of the previous treatment, and when the tooth does not admit of being stopped at the second interview, I protect the fresh dressing with mastic. The suppurating surface having been changed to a healthy one, I proceed to apply my bibulous layer, securing a strict adaptation in contact with the blanched pulp, when the operation is completed by filling temporarily with osteo, or lining the cavity with this material and inserting a good amalgam filling; or if a gold plug be contemplated, it is wiser to fill with osteo and defer the gold filling for a reasonable time.

It is scarcely needful to add that freedom from tenderness on external pressure—that is, from

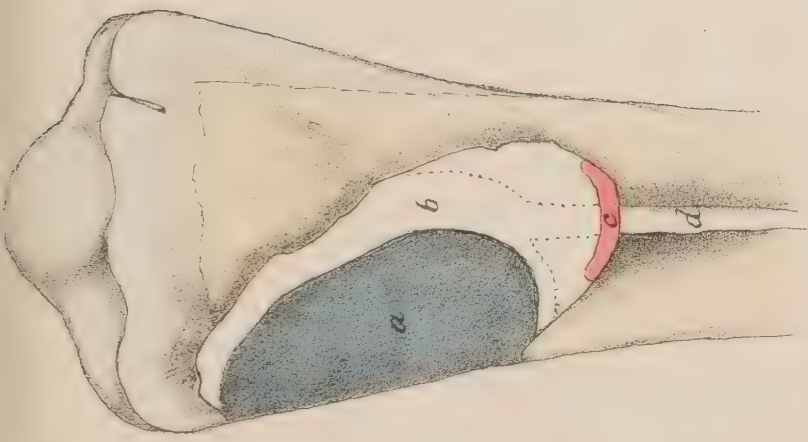


Fig 1.

VERTICAL SECTION OF AN UPPER BICUSPID.

- a.* Metalic Plug.
 - b.* Bibulous layer.
 - c.* Osteo-plastic lining.
 - d.* Dental pulp.
- The dotted line shows the condition of the dentine before cutting it down to a level with the pulp.

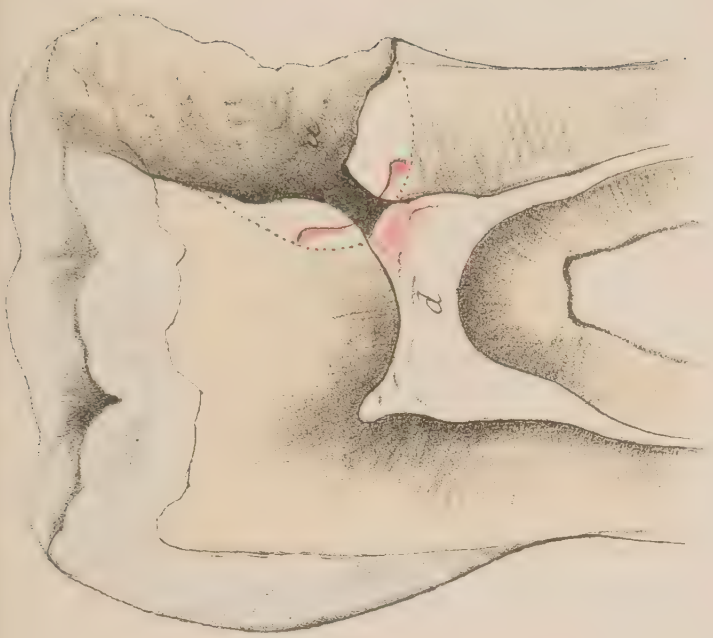


Fig. 2.

VERTICAL SECTION OF A LOWER MOLAR.

- a.* Orifice leading to suppurating pulp *d.*
- The dotted line shows the distance to which the dentine should be removed for correct adjustment of bibulous layer.

periodontal mischief or neuralgic irritation—must be ensured previous to plugging.

Difficult situations may be met by freely filing away the tooth; and I am bound to contend from experience—without wishing to lay down a hard-and-fast rule, each case presenting its peculiar features—that the above treatment, with certain modifications, meets all cases of exposed dental pulp, be they healthy, irritated, inflamed, or suppurating, when this organ has not become irreparably gangrenous or dwindled to dimensions of dead matter only to be met by extirpation and fang-filling; and I think this treatment, carefully carried out, commends itself for:—

1. Simplicity and painlessness.
2. Time saving.
3. A general absence of supervening symptoms.
4. Its wide applicability to all cases of exposed vital dental pulp; and,
5. Its *rationale*, taking the peculiar *habitat* of the pulp into consideration, is sufficiently analogous to the surgical treatment of other lesions of the body.

A few typical cases are appended to this paper, and I shall try your patience but a short time longer, whilst offering a few concluding observations.

Constitutional treatment must depend on the presence of systemic disturbance, which does not

of necessity accompany the local mischief, and when it does it is commonly *sympathetic*. With this impression I may incur the charge accredited to most writers on this subject, of being too much engrossed with the "local." Still, I am persuaded that topical treatment stands first in the way of removing local irritants, and that we have a right to count much upon the recuperative power of the pulp, that *vis medicatrix naturæ* which befriends us in the treatment of other lesions of the body, from cuts, splinters under the skin, burns, &c. The peculiar diathesis of the patient may favour or retard the progress of healing, and in so far the local treatment may be seconded by judicious antiphlogistic remedies, aperients, and astringent lotions. Constitutional depression of vital power or exhaustion after illnesses simply points to the necessity for temporary local expedients; but the principle of the local treatment advocated must not be departed from.

I desire to give emphasis to one feature in the treatment, and that is, whatever the state of an exposed pulp, short of gangrene, *cut down to it*, or level the adjacent dentine with the pulp's surface. I am convinced we cannot treat it effectually so long as a space exists between the pulp and the aperture leading to it; a fact which has more than once been impressed upon my mind through a carbolic acid dressing failing to blanch the pulp; showing that the caustic had

not touched it, as the inevitable result of contact is a white film or eschar. It is at this point that most operators stop short in their conservative treatment of diseased pulps. Mr. Woodhouse says in his paper already referred to, "When he ascertains that the pulp appears shrunk into the cavity, he at once decides to destroy it, as he considers it a sure sign that its vitality has been lowered, and that it would therefore perish under conservative treatment." A deduction which I believe to be erroneous.

If the pulp be inflammatory, it may with advantage be made to bleed, so relieving the hyperæmic condition, after which gentle syringing with carbolyzed warm water will have a beneficial effect, and prepare it for a temporary dressing.

When an aching tooth is not relieved in reasonable time by anodyne treatment, I have frequently found that exposing the pulp is effectual in affording relief, and in some instances suppuration will be found to have commenced, this morbid process under compression giving rise to aggravated pain.

I think the happy results attending the above treatment tend to show that the local destruction of the odontoblast layer does not prevent ossification of the pulp; but the greater our success the less our opportunity of gaining information as to the actual physical changes in the pulp so treated. Time will undoubtedly clear up the difficulty when

such teeth, from remote causes, may come back to us.

Failures may generally be traced to one of two causes: defective manipulation in difficult situations, or the presence of free dentine bodies in the pulp, at once so difficult to diagnose, and so prolific of neuralgic irritation.* When we are exceptionally baffled, and untoward symptoms succeed our efforts to save a pulp, we have an alternative in the operation of rhizodontriphy, and I, amongst others, set a high value on this expedient; but it is only when the first warning of irritation in a stopped tooth has been too long neglected that drilling a vent divulges a dead

* Soon after contributing a paper on the subject of "Secondary Dentine and Free Dentine Bodies as they affect the Preservation of the Pulp," to the "British Journal of Dental Science," for April, 1872, a most interesting case of this kind occurred in my practice. A lady resident in St. Leonards had suffered periodically from the most troublesome neuralgia, and had associated this with an upper second molar, right side. The tooth had been ably plugged with gold in Manchester; unstopped and re-filled by a much respected practitioner in London; and this annoying ordeal was again submitted to at my hands, perfect comfort having been enjoyed for ten days before I ventured to stop the tooth with white enamel. I should mention that caries had not reached the nerve, and the cavity, easy of access, was on the buccal surface. A fortnight only elapsed when the patient returned, bent upon having the tooth extracted. This done, I split the tooth open with a vice, and, occupying the upper part of the chamber of the pulp, were found two large independent nodules of secondary dentine.

pulp, and an irritated pulp may be thus relieved without necessarily leading to death.

Fifteen years ago arsenious acid was looked upon in America as the most important article in the dental pharmacopœia, because it enabled the dentist to achieve far more in conservative dentistry than any other one thing.* But this so-called “conservative dentistry” meant the preservation of a tooth minus the pulp—“the shell without the kernel.” I trust the dental student of to-day is imbibing a truer perception of what should be paramount in preserving the teeth—I mean the conservation of the dental pulp.

In conclusion, let me quote a conservative testimony from the far north: Dr. Brazier, of Stockholm, said at a discussion on this subject at Hamburg in August last, “He never destroyed a pulp. The day had gone by when arsenic should be used, unless a dentist wished to cultivate a batch of abscesses.”† No doubt many, east and west, are working in the same direction.

I am deeply conscious of the imperfect manner in which this conservative plea for diseased dental pulps has been raised, and beg to disclaim any controversial intention in my method of advocating—not a mere theory—but what has been put to practical test for the last three years, with

* The *Dental Cosmos* for April, 1862.

† *Johnston's Dental Miscellany* for November, 1875.

results which encourage me to pursue the same line of treatment. This treatment, aided by diagrams, I have now sought to reduce to a simple definite method, which I would earnestly commend for trial by all who have hitherto failed in their endeavours to restore and preserve diseased pulps. A sense of duty alone has impelled me to respond to a feeling which has always existed in the Society, that individual members should give their personal experience.

APPENDIX.

CASE 1. A lady was recommended to me in November, 1872, having been under medical treatment for facial neuralgia for ten days. On tapping a defective large gold plug in a second lower molar, right side, so much pain was experienced locally and in the region of the ear that I at once removed the plug, and discovered it to have been undermined by moist caries, which pressed directly on an inflamed pulp, a small aperture existing from which escaped a slight quantity of pus. I made a free exposure, and, after syringing and relieving the immediate aching, dressed the cavity with carbolic acid and a soft mastic plug, requesting to see the tooth again in twenty-four hours. The dressing was then repeated, and on the third day after the first visit, urged by the patient to complete the operation of stopping, as she was leaving Hastings, I did so, securing a blanched condition of the pulp, a careful adjustment of the bibulous layer, and filling the cavity temporarily with Guillois's cement. Six months afterwards, when making some artificial teeth for the same patient, the cement was discovered to have partly perished at the cervical portion, near the gum. Since

cient osteo was cut away to afford a good hold for an amalgam, and I have reason to believe the tooth is doing good service at the present time.

CASE 2 relates to the treatment of a polypus of the dental pulp, which has been already mentioned before the Society, but I may be allowed to include it as of sufficient interest in this short list of cases. A gentleman, aged twenty-five, who had been unable to use one side of the mouth for a considerable time, through the presence of a dental polypus in an extensively carious lower molar, on submitting his mouth for general attention in November, 1872, was persuaded to have the tumour excised with a view to plugging the tooth, as he would not consent to extraction. This accomplished with a sharp gum-lancet, the free hæmorrhage stanchcd, all trace of caries carefully removed, and the large wounded surface of the pulp blanched after treating with carbolic acid for several minutes, I proceeded by capping the pulp with two thicknesses of the bibulous layer—an extra precaution against pressure—and completed the operation, in one sitting, with Guilloi's cement. Eight months afterwards, the stopping, being much worn, was cut down for the suitable reception of an amalgam stopping. I had an opportunity of examining this stopping on the 1st of January, 1876, three years and two months after the original operation, and the tooth and stopping were intact, apart from a slight chip from a thin edge of the amalgam, the patient speaking of the tooth as one of the most useful in his head.

CASE 3. A neglected lateral incisor was presented for treatment nearly three months ago, the same tooth having been seen six months previously with an exposed pulp, but its extreme sensitiveness caused the patient to shrink from following up the proper treatment. On this occasion, some food having been forced up the nerve-passage, had set up irritation, and the pulp was highly sensitive, but had much receded. The cavity was cleansed and syringed, and the dentine cut down to a level with the pulp. This was treated for ten minutes with carbolic acid, capped with the carbolized bibulous paper, the cavity lined with osteo and the operation completed at the same sitting

with Fletcher's amalgam. No sensation of discomfort has been felt in that tooth for four months ! The patient is a member of my household, so that the case can be watched.

CASE 4. Miss A., a neighbour, desiring a partial upper denture, the second right upper bicuspid which it was desirable to preserve as a support was found to be decayed on both the mesial and distal surfaces. The tooth had not ached or given any trouble, but in preparing the distal cavity a distinct opening into the pulp canal was discovered, and a probe detected a receding pulp and caused aching for a minute or two. I at once cut down to the pulp, and was not sorry to see a little blood escape. The bleeding was quickly arrested, and all pain ceased under the ready influence of carbolic acid. The tooth was stopped at the same sitting, on the plan adopted in the preceding cases, and is fairly illustrated by fig. 1.

CASE 5. Mrs. D., on a visit to a neighbour, and with only three days at her disposal, came to me, having suffered a good deal of neuralgic irritation from a defective left upper canine. An old gold plug had recently fallen out, and now a peculiar phosphatic odour escaped. It was cleansed and syringed, the dentine cut down to the pulp ; this was made to bleed, and was dressed with carbolic acid, and after painting the gum round the tooth with iodine and aconite, the patient was sent away with a mastic plug for forty-eight hours. On her return, having been perfectly relieved, the tooth was filled with osteo over the usual bibulous layer, with a view to a permanent gold plug when the patient returns to Hastings next winter.

DISCUSSION.

Mr. COLEMAN said he should like to make one remark because he thought the plan he had advocated was misunderstood. A question was asked him at a former meeting, which, unfortunately, he had omitted to answer, and that question was, why he preferred the application of arsenic to the clearing out of the contents of the fang? His reply would have been that, when he had the opportunity, he always did clear out the contents of the fang; but the mere clearing of them out did not render pure a previously putrid tooth. In many cases it was utterly impossible to clear out the contents of the fang without almost destroying the fang itself, and in those cases he employed arsenic without doing so. There was also one little objection to clearing the fangs, namely, the danger of forcing some of the putrid matter beyond the apex of a fang. With regard to what had been said as to the deleterious action of arsenic, he had employed it very largely for nearly five years, especially in the case of children with their first teeth, and he had never seen the slightest indication of mischief to arise from its application, although he had seen mischief arise from its application in devitalizing a pulp, and not unfrequently, he believed, by the intense amount of inflammation so set up in that organ extending to the surrounding membranes. He believed if he had done any good to his fellow-practitioners, it was by introducing this remedy; and he asked the members to give it a fair trial, as he thought they would find it one of the best for periostitis that had ever been brought before their notice.

Mr. MOORE admitted the great importance of conservative processes in the preservation of the teeth. When escharotics were employed, he considered it was desirable to follow their application by that of some other agent of a soothing and un-irritating nature, and his impression was that preparations of lead best fulfilled this end. If caustic potash were the escharotic

employed, he should afterwards apply super-acetate of lead, and, before filling, carefully ascertain that a healing process had taken place.

Mr. C. S. TOMES said that one or two points had been imported into the discussion which called for comment. Undoubtedly, the great objection to devitalizing pulps was that, after they were devitalized, there was a tendency to alveolar abscess. He had heard a good deal as to the purposes for which the pulp was designed. "All-wise purposes," was the expression that Mr. Henry had used that evening. They did not in the least know what the purpose of the pulp was in a finished tooth, nor why the tooth should not do just as well without it. As a matter of fact there were a good many teeth in other animals which did just as well without it, and which lasted efficiently for the animal's requirements during its lifetime. There were certain teeth, for instance, in lizards, not replaced by other teeth, which were for a very long time in the animal's jaws, and in which there was no central living vascular pulp, yet they were not rejected by the creature as dead things to be thrown off. Until a little more was known as to the use of the pulp in a completed perfected tooth, he did not think that they were in a position to bring it in as something influencing their practice. In the present state of their knowledge, he thought that all their arguments about devitalizing the pulp should be confined to the danger resulting from it by the occurrence of alveolar abscess. He thought Mr. Coleman had struck upon a chord well worthy of consideration in speaking of the extension of inflammation from the pulp as being something capable of producing periostitis over and above the liability to have periostitis caused by putrefying matter. The vascular and nervous supply of the periosteum of the tooth happened to be very nearly identical with that of the tooth-pulp. He did not mean to say that other nerves and vessels did not enter into the periosteum than those derived from the trunks that supplied the tooth-pulps; but the greater part of the nerves and vessels of the periosteum were derived from branches going to supply the tooth-pulp. It was a matter of every-day experience that tenderness in the periosteum might

often be alleviated almost in a moment by applications to the tooth-pulp. If there were an actual inflammatory condition existing, they could hardly succeed in altering that at the moment. There was sometimes, certainly, a condition of hyperæsthesia, or an exalted state of the nerves in the socket, which was rather of a reflex nature. The point brought forward by Mr. Coleman as to the antiseptic action of arsenic, brought up to his mind the thought he had had for a long time, namely, the difficulty that was anticipated whenever a molar tooth came up for treatment, in carrying the applications down to the end of the fangs of the tooth which was being devitalized, either by arsenic or by the spontaneous death of the pulp. It would be a grand thing if some antiseptic could be obtained which would so enter into and combine with the actual substance of the pulp as to render it wholly incapable of decomposition. A more perfect fang-filling than the pulp of a tooth converted into something like leather could not be conceived. The misfortune was that the antiseptics in use did not travel far, because they caused coagulation of the albumen, which barred their progress.

Mr. SEWILL said he should like to ask Mr. Tomes whether the statement made by him, that the vascular supply of the periosteum was derived principally from the vessels which go to the pulp, was based on his own observation, or if it were the result of some other recent observations, as he was not aware of the fact.

Mr. TOMES believed the views he had expressed on the subject were those generally entertained by anatomists.

Mr. SEWILL said he was much obliged to Mr. Tomes for the explanation he had given, for he had not previously met with that statement. It was a very important fact, because if the vascular supply of the periosteum was derived from some vessels going into the pulp, they could understand more easily the readiness with which inflammation might spread from the pulp to the periosteum. Mr. Tomes's other remarks were in reference to the difficulty of dealing with the decomposed particles of pulp in the depth of the fangs. The remedy he thought

was to be found in absolute alcohol, which, though not an escharotic, would in many cases put portions of the pulp into such a condition that they would be incapable of decay. Some long time ago he brought absolute alcohol before the notice of the Society, and since then he had used it constantly in fang-filling. He first endeavoured to remove as much as possible of the pulp, then he dried the cavity roughly, and pumped absolute alcohol into the roots. In many cases it could be certainly known that it had penetrated to a considerable depth. It was extremely unlikely to set up any irritation, and if there were any shreds of pulp left, they were shrivelled and rendered into such a state that they would not decompose. Mr. Sewill alluded to the term conservative, as one much in vogue in the present day, both by surgeons and dentists : it was a fine-sounding word, but he thought often much misapplied. He considered Mr. Henry was right in drawing an analogy between dental and general diseases ; he had always done so, and gave the meeting some illustrations bearing on the point ; for instance, the preservation of a fractured limb, and the amputation of a gangrenous one, as parallel to the preservation of an injured pulp, and the destruction and removal of a gangrenous one ; but Mr. Henry appeared in his practice to adopt one uniform course of treatment for a variety of conditions of the dental pulp. Again, a pulp might have one or more of its root portions gangrenous, and how could they be treated without the destruction of the remainder ?

Mr. TOMES said the desideratum which he had alluded to was something which would travel through the whole of the pulp of the fang, so that the pulp might be left as a fang-filling.

Mr. WHITE : As far as the conservative treatment of pulp was concerned, he went with Mr. Henry heart and hand, but he certainly must differ from him in the wholesale deprecation of the use of arsenious acid. For many years, whilst arsenic in combination with creosote and morphia was in vogue, he felt he had not the success he desired, and therefore set himself earnestly to work to discover methods of preserving the pulp,

instead of destroying it. When carbolic acid was introduced, he believed he was one of the very first to employ it, and he had done so much upon the plan directed by Mr. Henry, viz., of first thoroughly exposing the pulp, and then applying the agent, which he did in the form of the crystallized acid, rendered fluid with a little glycerine: this evidently coagulated the albumen on the surface of the pulp. He next capped the pulp over with caps made of the thin hard vulcanite, obtained from between the two plaster surfaces from a flask, and filled over this, and his success had been almost universal; when, however, the pulp was suppurating and decomposed, he destroyed it with a paste composed of arsenic, carbolic acid, and glycerine, and very rarely with any pain being experienced. A patient had that very day applied to him, suffering intense pain, for whom, after freely exposing the pulp, he had applied the arsenic as mentioned, and who left him perfectly relieved of suffering, and for whom he felt sure he should be able in a week's time effectually to preserve his tooth. He agreed with Mr. Tomes, that many teeth could live without a pulp at all.

Mr. BARRETT asked how it was that in certain cases, after the destruction of the pulp by arsenic, and subsequent filling, everything went on smoothly, with no inflammation or abscess exterior to the tooth, while perhaps in the majority of cases alveolar abscess occurred, necessitating probably extraction of the tooth. How could the first desirable result always be insured? He thought carbolic acid afforded the key. A few years ago, when Mr. Lister introduced the carbolic acid method of treating surgical cases, it struck him (Mr. Barrett), that it might with very good effect be applied to dental purposes, and for the last four years he had frequently destroyed pulps with arsenious acid, and after removing what remained of the devitalized pulp as thoroughly as he could, he plugged the fangs and pulp-cavity with cotton-wool soaked in carbolic acid, mopping the interior of the fangs, and working it up and down, so that the liquid carbolic acid might penetrate to the extremity of the fangs. He had done this in a great many cases and was well pleased with the result. He did not recollect a single case in which alveolar abscess had followed this treatment,

and he considered that the good effect was due to the prevention of decomposition within the tooth by the carbolic acid.

Mr. DENNANT said it was due to Mr. Henry to state, that for many years past his treatment of the pulp exactly coincided with that described in the paper. For the past eight years he had not used arsenic in any case, though formerly he had used it constantly in combination with morphia and creosote. The result had invariably been, that by exercising patience he had conquered the case. He, however, thought that Mr. Coleman's suggestion of using arsenic purely for its antiseptic properties, was worthy of consideration, and he should certainly avail himself of it.

Mr. WEST said he had used arsenic for a considerable number of years, but was not perfectly satisfied with the results. Since he had heard of Mr. Henry's treatment, however, he had adopted it, and though sufficient time had not elapsed to enable him to judge to any very great extent, it had so far proved very successful in his hands.

Mr. STOCKEN said he had followed Mr. Henry's method of treatment for two or three years, and his success had been almost uniform. He had also used it in cases of suppuration; but in such cases the treatment extended over some few weeks, yet he ultimately succeeded in preserving the tooth.

Mr. MERSON said his practice had been in cases where the pulp had been exposed by accident, to immediately apply carbolic acid on blotting-paper, and cover in with oxychloride. At the expiration of a month he cut out a portion of the oxychloride, and filled in with amalgam or gold. In cases where the pulp was in a gangrenous state, he immediately applied arsenious acid and carbolic acid, and after twenty-four hours extirpated the whole, filling the canals with gold. In a congested state of the periosteum Mr. Underwood had strongly advocated lancing the gum freely, clearing the canals out, and pumping them with creosote. He had adopted this plan, and it had proved very satisfactory.

Mr. TURNER said he thought there was a want of definiteness

in the statements that were sometimes made with reference to the remedies applied. One gentleman spoke of arsenic, another of creosote, another of carbolic acid; but these expressions might mean different things in the hands of different people. For instance, when carbolic acid was spoken of, it might mean a solution of carbolic acid and glycerine mixed together in certain proportions; so "arsenic" might mean arsenic mixed with other substances. When such materials were alluded to, it ought to be distinctly stated in what proportions they were used, and in what manner they were applied. He was very much puzzled to know how gentlemen obtained the amount of success they sometimes described. He had not used arsenic for many years, but latterly he was beginning to re-employ it. Whether it was from his want of skill in the application of carbolic acid and other remedies which were so much lauded he did not know, but he found that he was driven to extirpate the pulp more frequently than he used to be.

Mr. THOS. A. ROGERS thought that Mr. Henry's contribution was one of the greatest interest and deepest importance. His own practice had always been to endeavour to save the pulp up to the time of suppuration and loss of substance, but after that had occurred he had not seen his way clear to attempting its preservation. Mr. Henry's idea of the temporary coagulation of the surface of the pulp by means of carbolic acid, was a new one to him. He had often wondered what happened underneath carbolic acid and nitric acid. He was not present when Mr. Coleman read his paper, but on reading it in the "Transactions," he gathered that the pulp remained unchanged after the nitric acid had been used and the filling put in. Lately he had read several accounts of the carbolic acid treatment, and that when the plug was taken out for the purpose of examining the state of the pulp underneath, that organ was found to be unchanged, and apparently quite healthy, but with no signs of calcification. He did not think that, however well such cases might answer for a time, this would prove satisfactory after two or three years, nor unless something was done to induce the pulp to calcify; and so far as he could make out, neither carbolic acid nor nitric acid produced

that effect. The reason why he did not think the pulp was likely to calcify, or to be successfully treated, after it had once begun to suppurate and to lose substance to any effect was, that when once the layer of odontoblasts had been destroyed, he doubted whether anything like formation of dentine could be resumed. He had heard it alleged in answer to this, that sometimes when a tooth was broken off, and the pulp left behind, it calcified; and there was a case of that kind in Mr. Tomes's book. He thought such cases would be very rare; but on some occasions, when he had had the misfortune to break off a tooth, he had noticed that either he drew out the pulp from the fangs with the crown, or else left the pulp collapsed on the fangs. It was quite possible that if it remained collapsed on the fangs the coagulum which was formed, and the projection of the edges of the gum beyond the fang, shielded the pulp, and so the remains of the odontoblast layer might produce a layer of dentine. He hoped the late succession of papers by Messrs. Hutchinson, Coleman, and Henry indicated that a new phase of inquiry was now about to be entered upon into the conditions and treatment of the pulps, and if he might be allowed to indicate the lines on which such observations should be conducted, he would suggest (1st), that the peculiar nature of the dentine pulp should be considered, viz., that it is a differentiation of mucous tissue approximating in its functions to periosteum; (2ndly), the nature of the diseases to which such tissues are liable, and their treatment; (3rdly), a consideration of the treatment of the pulp hitherto adopted, and its results; and (4thly), the application of these principles to the future treatment of the pulp. Of course this would be the work of years—short periods told us nothing in such cases. But he believed that a systematic course of observation, carried out on those or similar principles, would lead to much more satisfactory results than were obtained at present, and he was quite sure that the Society contained many members well fitted to conduct such an inquiry in the way most likely to lead to success.

Mr. HENRY in reply, said he thought his paper had laboured somewhat under a disadvantage, through his appended cases

not having been read, for they would really have been an answer to some of the objections raised, as, for instance, in reference to treating wounded pulp with carbolic acid, and the consequence of such treatment. Mr. Rogers and Mr. Coleman had both informed the Society that pulps which had been examined after such treatment had presented an unchanged and healthy surface. That was satisfactory; the surface so treated had become converted into a healthy one. What the ultimate result was, he was not prepared to say; probably it might retire a little, and a natural vacuum might be formed without any unsatisfactory result; at all events, the successful results which he had obtained, appeared to him to be complete. With regard to the treatment of a suppurating pulp, he would mention a particular case for the encouragement of those who were desirous of trying to save pulps in that condition. A fortnight ago, a lady brought her daughter to him. The child, nine years of age, had suffered from scarlet fever, and was very delicate. Deficient in masticating teeth, he was desirous of saving a badly-decayed six-year-old lower molar, right side, with the softened dentine exquisitely sensitive. The socket was free from periostitis, irritation being confined to the nerve, and constant discomfort preventing the enjoyment of any meal. He carefully removed as much of the sensitive and decayed dentine as seemed then desirable, and dressed the cavity with a pledget of cotton and carbolic acid, and a mastic plug. After a week of comfort, he removed the temporary plug, when the rush of cold air into the tooth produced pain, and the pulp was distinctly seen to be suppurating. Notwithstanding this, they would be surprised to hear that within an hour he sent the child away with the tooth stopped with an oxychloride filling in perfect comfort, and to his certain knowledge she still continued comfortable. When he saw the pus, he knew the purulent surface was confined to the upper portion of the pulp, which, when thoroughly exposed, he treated in strict accordance with the method he had been advocating. They might say, "Why save such a tooth?" but he was anxious to spare the child an operation. The cases cited in his appended list were all well known to him. One was in his household, and others among friends and neighbours. In

regard to the action of carbolic acid on a wounded pulp, he would mention his successful treatment of polypus of the pulp, as illustrating the limited and healing effect of this agent. The operation had been performed for a friend of his more than three years ago, and it had proved a complete success. Previous to the period mentioned, the patient had not been able to use that side of his mouth for mastication for a considerable time. He (Mr. Henry) had not imported the subject of periostitis into his paper at all. That inflammation of the pulp might run on to periostitis was unquestionable; but his particular treatment only applied to diseased conditions of the pulp in the absence of periostitis, or after this had been cured. He would not condemn the use of arsenic entirely in the case of dead pulps, for he had not yet attempted Mr. Coleman's method. Mr. Tomes had compared human teeth with teeth without pulp-cavities in some of the lower animals. In human teeth the communication through the dentine was cut off when the tooth was deprived of the pulp; whereas, in the teeth of animals, where the pulp-cavity did not exist, there was a normal vascular circulation going on through the tooth, so that he could not quite see how Mr. Tomes's comparison held good.

MR. TOMES: Not in all such teeth. There were some teeth exactly analogous in structure, with unvascular dentine, which formerly had pulp, and ceased to have it.

MR. HENRY said he was too happy to give way to Mr. Tomes, because his own knowledge of the comparative anatomy of the teeth must be very imperfect. It only seemed to him that the comparison was scarcely in place. Some gentlemen had said that they would still use arsenic for the purpose of devitalizing the pulp; but he thought, that if they would carefully peruse his paper with the appended cases, they would change their minds. He was quite certain that the future would condemn the use of arsenic in the treatment of living pulps. It had become known among his patients that he did not destroy the nerves of teeth—a fact which was hailed with satisfaction. He had formerly used arsenic with frequent painless results; at the same time his success in the conserva-

tive treatment warranted him in giving up the use of arsenic. He had not, as Mr. Sewill thought, limited his treatment to one condition of the pulp, but it applied to various conditions—irritated, inflamed, suppurating, &c., and included polypus of the pulp. He thanked the meeting for the reception his paper had met with. Some of the members he considered had supported him strongly, and he hoped that this would be an extra inducement to others to try the method.

On the motion of the President, a hearty vote of thanks was accorded to Mr. Henry for his interesting paper, to the gentlemen who had taken part in the discussion, to the introducers of the casual communications, and to the donors to the Museum. The meeting was then adjourned to the 6th of March, when the elections of members and other general business will be transacted. A casual communication on "A new Mouth-bag to be used in connection with the Rubber-dam" will be brought forward by Mr. Vanderpant, and a paper "On the necessity for the exclusion of Air as well as Saliva in Gold Fillings, and the best means of obtaining these results," will be read by Mr. Spence Bate, F.R.S. On Wednesday, the 15th of March, an additional ordinary Meeting of the Society will be held for the convenience and at the express wish of members of the Society who come from a distance to attend the annual dinner of the Dental Hospital of the 16th proximo, when, in addition to casual communications, a paper will be read by Mr. Charles S. Tomes, "On the Nature of the Alveolar-Dental Membrane," and a casual communication made by Dr. William Jelly, of Madrid, on "Symmetrical Deposits of Pigment in the Teeth."

GENERAL MONTHLY MEETING.

March 6th, 1876.

CHARLES VASEY, Esq., PRESIDENT, IN THE CHAIR.

The minutes of the last meeting were read and confirmed.

The following gentlemen were elected non-resident members :—

Mr. J. F. CORBETT, L.D.S., 3, South Mall, Cork.

Mr. GEORGE HILDITCH HARDING, L.D.S., Manchester.

Mr. HUGH PATERSON, Sydney, Australia.

The following gentlemen were elected resident members :—

Mr. DAVID CORMACK, L.D.S., 77, Margaret-street, Cavendish-square.

Mr. GEORGE WM. FIELD, D.D.S., 39, Upper Brook-street.

Mr. GEORGE WM. PAYNE, L.D.S., 34, Ebury-street, W.

Mr. LOUIS BURGOYNE PILLIN, L.D.S., Conduit-street, W.

Mr. AUGUSTUS WINTERBOTTOM, F.R.C.S., 16, Sloane-street, W.

The following gentlemen, having signed the obligation book, were admitted members :—

Mr. HENRY MALLET.

Mr. DAVID HEPBURN.

Mr. DAVID A. WORMALD.

Mr. SIDNEY WORMALD.

Mr. ROBERT HOPKINSON.

Mr. THOMAS WORMALD.

Dr. L. MARTINI.

The PRESIDENT announced a donation to the Library: viz., "Student's Guide to Dental Anatomy and Surgery," by Mr. Sewill, presented by the author.

The PRESIDENT stated that, owing to the length of time occupied in the balloting of members, Mr. Vanderpant had kindly allowed his communication to be postponed to the next Meeting.

On the Necessity for the Exclusion of Air, as well as Saliva, from large Gold Fillings, and the Best Means of obtaining these Results. By
MR. C. SPENCE BATE, F.R.S.

MR. PRESIDENT AND GENTLEMEN,

THE many efforts that are being made from time to time to improve the character and condition of the gold that is used for the operation of filling teeth, while they demonstrate a desire for excellence of material, also afford evidence that the desire has not been attained.

The variety in character of gold is equalled by that of the instruments suggested; some urging the adoption of serrated points, others of smooth; some advise square and polished instruments, and others insist on instruments tipped with gold points. Again, we hear advised the use of heavy mallets, while others recommend light steel hammers; some mallet from the commencement to the termination of the operation, while others employ strong pressure, with hammer hardening as a finish to the work.

With all this laudable desire to attain excellence it is not to be supposed but that a great advance has been made over the highest standard of a quarter of a century since.

There are some operators of whom we hear that it is impossible almost to excel, and such cannot be praised too highly. With all respect for these, I think that it will be admitted by our experience on all sides, that in the large bulk of operations in gold the average does not exhibit a higher standard than was apparent some thirty years since. Large gold plugs are yet the exception to the general rule: of these the proportion is great that will not bear the general wear-and-tear of oral duties.

The several kinds of gold offered to the profession are stated to be the most pure, the most ductile, the most adhesive, and the most capable of being welded into hard masses. Some are recommended because they are a new and improved material, and others because they have been on trial for many years.

The varieties are numerous:—adhesive, non-adhesive, spongy, crystalline, cylindrical, thin foil, thick foil, thicker, and very much thicker. All and each are strongly recommended, and have, no doubt, their admirers. All operators, however, agree that there is one thing essential in the manipulation of gold, whether adhesive or non-adhesive, and that is, moisture of all kinds must be excluded from contact with the gold during the process of plugging. So essential appears this condition to be, that I remember reading of a skilful operator who attributed his difficulty to compress a portion of spongy gold into a solid mass to the evaporation

of moisture from a kettle of water boiling in the same room.

To overcome this difficulty all sorts of contrivances have been suggested.

The mouth may be plugged with cotton wool. The salivary ducts may be plastered over. Syringes and siphons may be used, and the rubber-dam may be applied. This last has become the most important. Each has been used with a certain amount of success, but generally least so where most important. All are dependent upon the endurance and co-operation of the patient.

I have little doubt but that, equally with myself, many operators have been disappointed with the permanent duration of their work after having conscientiously devoted their utmost skill with the best appliances at their command.

Plugs that have taken a high degree of polish, and have resisted probing with the sharpest instruments, have too frequently been found to become soft and bulge outwards at the end of a few months' wear, and ultimately break up.

The general explanation of this result is, that during the operation, saliva has leaked into the cavity, and the gold has more or less been prevented from being welded together in consequence of the surfaces of the several portions of foil having become moistened, and so prevented from being brought into immediate and close contact with each other.

To obviate this interference with the perfect completion of work, the greatest care is inculcated, not only to exclude saliva during the operation, but also to expel all moisture from the cavity previous to its commencement.

That saliva may be kept in abeyance in many cases with care, is possible, but certainly moisture never can.

We all know that a tooth when removed from the mouth does not become dry under many hours, and also that moisture from the breath will condensate on any surface colder than itself. Thus the passage of the gold pellet through the mouth collects a rime of moisture upon its surface sufficient to interfere with the perfectly dry contact of two surfaces of gold.

In spite of this, we find that a large number of gold plugs are inserted and consolidated with success. The question therefore arises, whether or not the presence of moisture is so fatal to the permanent solidity of gold filling as is generally believed, or whether the cause may not be due more immediately to other interference.

My own opinion has long been towards the latter hypothesis, that the presence of air entangled within the folds of the gold during the process of introducing the plug is, I feel with confidence, the great cause that interferes with the perfection of large gold stoppings.

It appears to me that the means employed to

insure the dryness of the cavity by the introduction of hot air, &c., are sources of aggravation on this point, and are only the less appreciable in consequence of the extremely cautious and careful manipulation of the best operators.

Leaf-gold, in whatever form it may be rolled, must envelop between its folds a large quantity of air, which, being compressible, is forced down into the deeper recesses, where the cessation of pressure permits it to rest until the entire mass of stopping is raised to the temperature of the general system. The compressed air by this means becomes more rarefied, and acting as a pressure from within, escapes through such crevices as may exist. The consequent result is, that the saliva from the mouth that laves the tooth persistently, by capillary attraction is drawn into the passages through which the compressed air escaped, carrying with it in solution the salts and mucus of the mouth.

Thus it is, it seems to me, the plug that once appeared to have been solid and well condensed becomes soft and permeated throughout with salivary deposits. Not only do I contend that the presence of compressed air is a source of detriment to successful gold plugs, but that it is an immediate, if not constant, source of periodontal irritation and alveolar abscess.

If the pulp be removed from the cavity of a tooth and the fangs be thoroughly cleansed and

dried, and a small quantity of fluid, say oil or glycerine, be dropped into the same cavity, a bubble of air will be seen to rise up through the cavity and escape. It is my strong conviction that it is this bubble of air that induces decomposition of any portion of devitalized tissue that has not been removed, just as a small quantity of air will destroy a whole can of meat, however otherwise well preserved.

I have dealt more largely on this subject in a memoir that I have forwarded to the Odontological Society of New York, under the title of the "Antiseptic Treatment of the Pulp in cases of exposure," &c.

Feeling certain that the presence of air is one of the more immediate disturbing causes interfering with the perfect consolidation of a gold plug, and its permanent retention within the cavity of a tooth, it becomes necessary that we should ascertain the means by which it may be excluded.

If we take a sheet of gold foil and lay it smoothly on the surface of a plate of glass, the greatest difficulty will be experienced in placing and retaining it in immediate contact with the entire surface. But if the same be inserted under water from which the air has been expelled by boiling, the sheet of foil will be found to be capable of being brought into immediate contact throughout its entire surface.

If this be true with regard to a sheet of gold on a surface of glass, it will be found to be still more so in relation to two sheets of foil. This contact is due to the fact that the water takes the place of air between the two surfaces, and, unlike the latter, the water is not compressible, and therefore is capable of being forced out from between them.

If this be executed with exactitude, the two surfaces are not capable of being separated without tearing. The contact is one of mechanical adhesion only, and equal to the extent of fifteen pounds, the atmospheric pressure on each square inch.

This appears to raise the question whether moisture free from extraneous matter is in itself detrimental to the perfect adhesion of two surfaces of pure metal of the same character and condition.

My own experience tells me that the presence of water that is free from air and any substance in solution cannot have any deleterious influence in preventing the perfect cohesion of clean surfaces.

In order to give force to this opinion, I have filled with gold taken out of water several large cavities in certain teeth, which I think will clearly demonstrate that, whatever shortcomings there may be in the perfection of form attributable to manipulation, the gold is capable of being as closely compacted under moisture as it is dry.

The first experiment consisted of a lower molar, in which a large cavity was drilled into the masticating surface (fig. 1). I made the cavity as nearly as practicable perfect, according to my notion how such a cavity should be made for the purpose of receiving a gold plug.

It was flat at the base, having the walls perpendicular to it, with the exception of the upper margin, to nearly the depth of the enamel, which was bevelled off, or slanted outwards.

This tooth I put into clean freshly-boiled cold water, where it remained until the dentine was saturated with moisture. I then carefully plugged the cavity with some of Ash's No. 1 gold, which I prepared in a manner that I shall describe, and placed it in water, taking it out streaming wet, and forcing it into the cavity until I could not press in any more. The gold was all inserted with hand-pressure, without being placed in a vice, and malleted at the surface only. I then polished it and put it aside for a day or two, and then threw it into an inkstand filled with writing-ink, where it remained for some days, when it was taken out and again allowed to dry; after which I split the tooth into two pieces, took out the gold filling, and found that not the slightest amount of discoloration from the ink had penetrated either between the walls of the cavity and the gold, or into the substance of the filling. The gold was then annealed and beaten into plate, a circum-

Plate II.

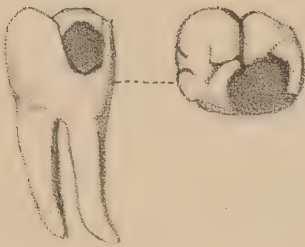
1.



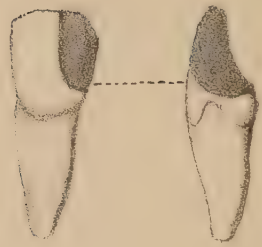
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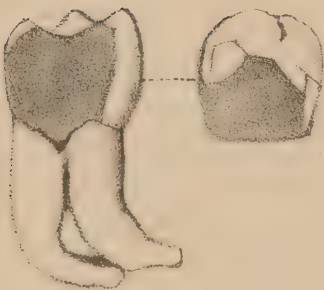
3.



4.



5.



6.



stance I contend that could not have occurred if the presence of moisture between the folds of the foil had in any way been detrimental to the perfect cohesion of the several surfaces brought into contact ; a fact, moreover, that would have been utterly impossible if the ink had penetrated into the plug.

I have in the same way plugged four other teeth having large cavities ; one (fig. 2) of which is on the masticating surface, a second (fig. 3) is partially so ; a third is on the approximating surface. These three are molar teeth, while the fourth is a central incisor (fig. 4) : all of these are built up in the shape, more or less perfect, of the original tooth.

My next experiment was with some spongy gold. This may barely be considered as being a fair test, for the material had been many years shut up and neglected in a drawer ; and, moreover, my own experience in plugging with spongy or crystal gold is limited and unsatisfactory.

I subjected this substance to a similar treatment, and placed it in the cavity of a tooth prepared for the purpose, itself, as well as the tooth, being saturated with water. The result was that a plug was made that appears to be perfectly hard and firm and capable of taking a fair polish, but I found myself incapable of building with solidity any elevation beyond the extremity of the walls of the cavity.

There are two specimens of this kind upon the table.

The next experiment was one of a different kind, and originated in the supposition that it was very probable that more or less air was likely to get entangled within the folds of the foil during the necessary exposure of the gold after it was taken from the water, before being compressed into the cavity of the tooth.

I therefore thought, if I submerged the gold in glycerine, that I should be able to work with a fluid that would exclude the air, if it would admit of the gold being compressed into a permanently solid mass.

This I was the more desirous of ascertaining as I am in the habit of using glycerine to a very great extent in the conservation of the dentinal pulp, it having properties that arrest decomposition and preserve tissues in their normal condition to a very wonderful extent. Even when in a morbid state, the character of the structure may be retained by the influence of this medium.

Its value as a curative power is yet to be studied, and its importance yet to be appreciated.

I have, in many instances, after having wounded the dentinal pulp in deep excavations, and relieved the pain consequent upon such incision by the application of carbolic acid, saturated the cavity with glycerine, and filled the tooth immediately without capping, with permanent satisfactory results.

I can only account for this theoretically, by assuming that the glycerine acted on the devitalized surface of the dentinal pulp, so as to preserve it from decomposition, and so retain an insensible barrier between the living pulp and the artificial plug.

Believing as I do in the importance of glycerine as a remedial agent, I was very desirous of ascertaining the extent to which gold would combine when submerged in it. I therefore plugged two teeth (figs. 5, 6), molars, with large lateral cavities, with gold that was so submerged. I scarcely think that the finish is as compact as those that have been steeped in water only, but the defects appear to me rather of manipulation than of any deficiency arising from the power of a solid and hard gold plug being interfered with by the action of glycerine; and the power of solidity being given to such plug depends, in my opinion, on the extent to which the air has been excluded from the plug, and not upon the presence of moisture or glycerine.

I have throughout confined the term moisture to mean water, or aqueous vapour free from any foreign admixture, and therefore do not include saliva, which contains salts in solution and much viscid substance that cannot but be prejudicial to the work under any circumstances.

It must, however, be remembered that the viscid material in the saliva does not combine with water, even after a very considerable period of admix-

ture ; and therefore can, without any undue effort, be precluded from entering into a cavity during manipulation.

The manner in which I have generally prepared the gold for this process is by cutting the book up into various sizes, and folding the several pieces into loosely compressed balls, touching them as little as possible with my fingers. Some, also, I roll and compress into long plates ; all of these I place into perfectly clean water. They will be found to float upon or immediately below the surface, and will so continue until the water be boiled for a short time, when, the air being expelled, the pleggets of gold sink to the bottom.

The gold which I have generally used for this purpose has been that made by Messrs. Ash, and known as No. 1 in thickness, and is the same used in the accompanying experiments.

The gold so treated works more plastic than it previously did ; and I contend, that with less amount of labour, it is capable of being wrought into a perfectly impervious stopping.

I am aware that gold plugging of the highest quality is done by expert operators, but this is only by an amount of care and attention on their part, and patience and forbearance on the part of the patient, that few can be induced to undertake.

It is to these skilled operators, I affirm, that the same result is capable of being attained, with less toil to themselves and endurance to their patient,

within half the time that they have been accustomed to devote to it.

It is now five-and-twenty years since I made my first experiment, and I was induced to try it from the circumstance of having to replugin a tooth that had been stopped by one of our best operators.

The plug, while it appeared to be entire and perfect at surface, I found on pressure to not more than half fill the cavity which it was intended to stop. This circumstance I attributed to the presence of a quantity of air being entangled in the gold, which allowed a space to exist in the body of the plug that the operator never supposed to be present. I have experimented in the same direction occasionally since then, and it was only after watching a plug of nearly half the size of an upper molar tooth, for nine years in an interstitial cavity, that I attained confidence to have an opinion at variance with those that are generally accepted.

I have now inserted some hundred of such plugs in the mouth, and my own experience has not enabled me to have to condemn but one or two of them.

In bringing this subject before the Society, I have done it with a feeling that I am standing alone, with every man's hand against me. But of this I feel assured, that in the Odontological Society, while I shall receive and invite the severest criticism that experience and ability

can suggest, it will be administered with all the fairness and courtesy which intellectual members of a liberal and educated profession ever give to the expression of an idea at variance with commonly received opinions.

DISCUSSION.

Mr. UNDERWOOD said he had listened with great interest to Mr. Spence Bate's paper, but could have wished to know more fully the writer's experience upon the two different kinds of gold—the adhesive and the non-adhesive. Writers had expressed themselves very strongly on the importance of never permitting moisture to come in contact with the gold; but there were cases in which even that great aid to this end, the "rubber-dam," could not prevent it, and the operations, to use a strong term, unavoidably became "sub-aqueous." Owing to the position he held at the Dental Hospital, he had large opportunity for seeing the results of gold-plugging accomplished under very different methods and plans, and he came to the conclusion that the presence of moisture might be compatible with a good plug effected with non-adhesive gold; but that, with adhesive gold, such a plug, however well it might appear after completion, would, in a few years at most, become defective, and break up. The general practice at the institution he had named was to fill the greater portion of the cavity with non-adhesive gold, and complete with adhesive; but in carrying out the latter they deemed it imperative to exclude, not merely the saliva, but also as much as possible the influence of the moist breath from the lungs. He felt much indebted to Mr. Spence Bate, as occupying so high a scientific position, descending to so practical a subject, and for which he felt sure all his professional brethren would thank him. He would like to ask Mr. Spence Bate if he even preferred moisture to dryness in plugging with non-adhesive gold.

Mr. SEWILL wished to ask Mr. Bate whether he considered the view that had been expounded by Mr. Makins was a correct one;—namely, that the cohesion of gold was a process of cold welding exactly analogous to the welding of partially molten iron, or such metals as platinum, tin, and lead, in, he believed, the cold state. If the union of gold was of

such a character, it appeared to him that theoretically the presence of moisture must operate against it. With regard to non-adhesive foil, experiments of late years had shown that it was comparatively easy to make a moisture-tight plug with that foil; and he thought that a great amount of pressure would expel the moisture from such a plug, but he had certainly never yet succeeded in obtaining cohesion of adhesive foil which had become moist. The difficulty of making a perfectly water-tight filling with adhesive foil was extreme, and no doubt the experiments made by Mr. Charles Tomes had set many to experiment in the same direction. He had always found that to secure a water-tight filling with adhesive foil was extremely difficult even in a perfectly dry cavity, unless the gold was packed with the greatest care, and in minute portions.

The PRESIDENT said he had always thought that too much stress had been laid upon the necessity of keeping even the breath from adhesive stoppings. He had seen a great many large stoppings that had failed after a time and at one corner, and he had considered that that was due to a drawing together of the adhesive foil when consolidated at the centre. An adhesive plug had a tendency to draw from the circumference when it was consolidated, and he had always been careful, as far as he could, to work, as it were, from fixed points, attaching every piece of the adhesive stopping as he went along.

Mr. TURNER said that a short time ago Mr. Ashley Barrett had read a paper before the Society in which he maintained that the gas which was driven through the apex of the foramen of a tooth canal was the cause of periodontitis and alveolar abscess, and it would be very gratifying to him to hear that the same view was adopted by Mr. Spence Bate. That gentleman had somewhat taken their breath away by the clear manner in which he had demonstrated that a good gold filling could be carried out under conditions hitherto deemed fatal to success. He had stated that he could, by using non-adhesive gold in certain forms, immersed in water previously boiled, build up the side of a tooth, making it to all intents and pur-

poses answer the conditions of adhesive gold without the disadvantage attending the latter—viz., of a drawing towards the centre of the cavity, as pointed out by the President. When such important matters were brought before them unexpectedly, it was almost impossible for them to give a decided opinion. Mr. Spence Bate had laid stress upon the length of time necessary to thoroughly dry a tooth even when out of the mouth ; but by employing fluids which evaporated rapidly, such as absolute alcohol, this end could be attained in a very short time in the mouth, at least so far as concerned all practical ends, especially if such agents were employed in conjunction with the rubber-dam. The writer of the paper had admitted his imperfect success with spongy—the very highest form of adhesive—gold, which in his, Mr. Turner's opinion, went to prove that the presence of moisture was inimical to the employment, with success, of that form of gold.

Mr. COLEMAN said he was not greatly surprised at that part of the paper which stated that water-tight fillings could be made with non-adhesive gold in the presence of moisture, because he believed that many fillings that were done by old practitioners were carried out without regard to the presence of the fluids in the mouth. The masticating surfaces of the lower molars were filled by simply keeping the tongue and the cheek out of the way with the finger and thumb ; and by great pressure plugs, since proved to be water-tight, were made, which lasted a very considerable number of years. In using some amalgams, it was not an uncommon practice to wash them and squeeze out the moisture before applying them. They kept the cavity dry when they could, but occasionally, perhaps, it was impossible to do this, and this further moisture was probably squeezed out by the pressure of the condensing instrument. In using non-adhesive gold it was probably possible, by a very considerable pressure, to squeeze out all the moisture, and he could not help thinking that under that process most, if not all, of the air would be squeezed out also. He thought Mr. Bate had laid too much stress on the presence of air, because if the plug were perfectly solid throughout, a small portion of air contained within it would not be exposed

to a very considerable amount of pressure. If it were introduced into the mouth at 60° Fahrenheit, it must be more or less warmed in the process of putting it in, and whilst being placed in the tooth itself; and then it would be exposed to, say, a temperature of 100° Fah. The difference, perhaps, would be, on an average, from 25° to 30° Fah., and that would not be sufficient to expand the air to any considerable extent, so as to force a firm filling out. They could only feel too glad if the conclusions arrived at by Mr. Bate were correct, because in many instances it would be a great relief to them to know how to manipulate gold by what might be called the wet method. He was, however, certainly surprised to hear that such good results could be obtained with adhesive gold; for it had always occurred to him as a *sine quâ non* in manipulating gold in that form, that moisture should not be present, and that even the moisture of the breath would, to a considerable extent, interfere with perfect results.

Mr. HUTCHINSON asked Mr. Bate how he applied practically in the mouth the principles which he had enunciated with regard to the treatment of teeth out of the mouth? How he secured the presence of such a fluid as perfectly pure water? Whether he applied the rubber-dam, and drowned the tooth with boiled water, or did not use the rubber-dam and put the gold into the cavity filled with the saliva? Also whether he did not consider that a tooth which had been stopped with gold that had been soaked in water, when exposed to the ink-test should not take up ink, seeing that already the gold was surrounded by a layer of moisture? He did not think that a tooth filled wet with gold would be as likely to take up any ink as one filled only with air. The capillary attraction in a moist tooth would not be so great as in a dry one; and therefore he thought that the ink-test which had been applied by Mr. Bate was scarcely so strong as it would have been if the gold had not been wet.

Mr. WALKER said that for years he had paid great attention to plugging with adhesive gold, and certainly Mr. Spence Bate had taken him by surprise when he said that he could plug with adhesive gold with presence of water. Ten years ago he heard

Mr. Woodhouse speak of having plugged with non-adhesive gold, dipping it into water, and he himself tried it, and certainly made some very fair specimen plugs ; but he could not see how they could introduce water into the mouth without its becoming mixed with saliva. He would be glad to hear how Mr. Bate overcame the presence of saliva with the water ; because, so far as his experience went, one atom of saliva would thoroughly interfere with the union or cohesion of one atom of gold with another. His experience was that even the breath would separate one layer of gold from another, and that circumstance had cost him days and months in cutting away plugs and beginning again, when, from restlessness of a patient, his rubber-dam had slipped, and the breath had acted upon the minute particles of adhesive gold. It would certainly be the best evening he had ever spent if Mr. Spence Bate could teach him how to introduce adhesive gold without the breath affecting the result.

Mr. SPENCE BATE in reply said he did not ask gentlemen present to take what he had said for granted. Let them give it a fair test, and in six months hence express their opinion. He thought it would be found that the same result could be obtained with less labour to themselves and the patient. Mr. Underwood had said that with adhesive gold if the stoppings got slightly wet he could make them last for a few years, but ultimately they would break up. It seemed rather puzzling that if water made the adhesive gold break up in two or three years, it should allow it to unite at all. If it was so far adhesive as to stand for two or three years, it ought to stand longer. His theory was that in adhesive gold was mixed a certain amount of air which caused a continual pressure from within. In reply to Mr. Coleman, he thought that 25° of increased temperature was a very small amount in itself, but if kept on persistently for weeks it would be found that the stoppings did break up, and he himself had been sometimes very disappointed at finding a stopping broken up which he had felt thorough confidence in. He had been connected with the profession now so long that he had seen the work of nearly every man of note in his day. Of these he had met with

plugs that were not what they were intended to be. This must be from some cause over which the practitioners had no control, and he was of opinion that sufficient weight had not been given to the fact that, as usually performed, air was introduced into the stoppings. Mr. Sewill had spoken with regard to the welding of gold, and he would merely say that his experiments had been chiefly with non-adhesive gold, but he had used adhesive gold with it when he wanted to build up the surface. He used it simply because he happened to have some adhesive gold that was thicker than his usual non-adhesive gold. He had frequently found that by using serrated points and plugging carefully he could build up the same as with adhesive gold, but it must be done with care; and sometimes when he wanted a large block he had to make the cavity in the gold and re-plug. The incisor tooth which he now exhibited had, when first finished, a soft place in the front. He drilled a hole into it and re-inserted a fresh plug. It appeared to him that it must have been tolerably solid to stand the test of that work. His experience, however, had not been so much with an adhesive gold, simply because his method enabled him to work non-adhesive gold in the way usually adopted for adhesive gold. Mr. Turner spoke with regard to gas passing down through the alveolus. What had been stated in the paper with regard to that was merely a divergence to show why he used glycerine. Some few years ago a gentleman connected with one of the expeditions sent him some crustaceous animals from Cape Horn, and one of them was a crab, beautifully flexible, as if it were fresh. He asked the gentleman how it was, and the answer he received was that he did not know, except that he had put it in glycerine for a day or two. He had since then put such animals in glycerine for a short time, and it seemed to toughen the tissue and allow it to be flexible. He had since treated teeth with it as a conservative medium, and he had found that the pulp had been rendered by it perfectly solid, firm, and not destroyed. He remembered once operating on a lady for the extraction of a large number of teeth. One of the teeth must have passed into the antrum, as a few days afterwards a swelling arose, and on probing into the cavity he found a quantity of matter. He first inserted a little

carbolic acid, to touch the surface. Next day the matter was still flowing, and he washed it out with glycerine, and found that the following day the flow had lessened considerably. He repeated the glycerine again ; and within the week it stopped, and the alveolus healed over. Within the last week he had seen a patient with a large swelling over the eye-tooth. He cleaned out the pulp-cavity, and wiped it out, first, with carbolic acid ; then he immediately plugged and forced as much glycerine as he could into it, and the whole swelling had disappeared and the tooth had since been stopped with Hill's gutta-percha, preparatory to being plugged with gold. The day before he left Plymouth he had another case, of a man who had had a gold plug put in very nicely. The face was swollen, and he took out the plug, and in doing so, matter gushed out. He forced glycerine into it ; the swelling had disappeared, and it seemed to be rapidly healing. The stopping had been put in by a man of very good position and very good ability ; but still, when the stopping was taken out, although at first it seemed hard, it was not welded, but came out all in pieces. He had had similar experience with regard to a large number of cases, and he questioned whether the amount of welding took place which was sometimes supposed. Whenever he had had occasion to remove plugs, they had not been welded specimens. In one case it was so hard that it was necessary to drill it out ; but he had very rarely seen stoppings so put in. Adhesive gold was put in with a large amount of labour ; and at any time the whole stopping might be destroyed, because it was done dry. With the exception of the spongy gold, to which he had referred, his researches had been confined to non-adhesive gold, and he admitted that with spongy gold he could not build beyond the surface. If welding meant two surfaces united together by pressure, the surface of the tooth which he now exhibited was certainly welded, and that was done with wet adhesive gold. Mr. Hutchinson was mistaken in one point when he spoke about the ink test. After the tooth was taken out of water, and filled with the wet filling, it was put aside for two or three days, until it was perfectly dry ; and therefore capillaries were more liable to act than had there been any water present. It was in the inkstand several days ; then it

was taken out and again allowed to dry, and that same gold was beaten into a plate. If the ink had penetrated into the gold, it could not have been beaten into a plate, and consequently he thought that the plug must have been impervious to moisture. One gentleman had asked him how he managed to put it in with water. His rule was to work with the same caution as in dry stopping. He always felt that, whatever care was taken, there was a liability to failure; and no person should be careless in any operation. His object was to get the saliva as much as possible out of the mouth. He did not generally use the rubber-dam, because he had found by experience that when he had just got it in nicely, the patient was very apt to pull it out; and in private conversation he found that many other dentists met with the same difficulty. Patients would not submit to it; but many practitioners told him that, though they keep the rubber-dam, they do not use it so frequently as many might suppose from reading the Journals. He got the saliva clear of the tooth as much as possible, by holding the mouth in such a position that it should run out. He generally managed to get far advanced with the filling before he allowed the mouth to be shut, then by inserting a plug of cotton wool saturated with water; and in that way he could keep the saliva much more readily from the tooth than by any other process. For it must be remembered that the viscid portion of saliva would not mix with water. The only part that would mix was the watery portion, and that carried the salts; but the presence of water would, at all events, make it more dilute and more capable of being pressed out than otherwise. If they took a dozen sheets of gold and placed them under water, and boiled the water, and then laid the sheets down between two pieces of wood or cloth, and then compressed them, the cohesion would be found to be very great indeed. He thought the reason was, that the gold surfaces were brought into contact without any air between them. He had extracted a large tooth with an interstitial stopping from a lady's mouth, after being inserted by the wet process for nine years; and it was then as solid as it was when it was first put in. He believed that in the mouth of a friend there was a tooth which he had filled twenty-five years ago in that way. He also found

that by this method the gold was not liable to kick or roll, as sometimes occurred in the dry process. He had then in his hand a tooth which he had extracted from a lady's mouth after it had been filled twenty-five years; and on cutting it in two, he found that the decay had never been taken out. He contended that this could only be explained by the fact that there was no air allowed to be in the tooth. That there was moisture in the tooth was certain, because the decay itself was wet, and he believed that the stopping was put into the tooth in that condition. He remembered, when he first went into practice at Swansea, a lady coming to him with a great deal of pain. He did what was a common thing—wiped out the tooth, and put in a black amalgam, consisting of silver and mercury—most likely a shilling filed down. That tooth had lasted eleven years, and was then extracted by a surgeon instead of a neighbouring tooth. In putting in the plug he had taken no particular trouble, but it had remained there for eleven years without the decay increasing. He could only account for that by the circumstance that the cavity must have been full of saliva, and that the plug was clapped in when there was no air there. He held that the presence of air tended to the decomposition of the tissues much more than moisture did.

The PRESIDENT said he was sure the meeting would approve of giving Mr. Spence Bate a double vote of thanks;—the one for his very excellent paper, and the other for his very excellent reply. He also wished to thank the donor for the contribution to the Library.

The Meeting was then adjourned to the 15th instant.

ADJOURNED MONTHLY MEETING.

Wednesday, March 15th.

CHARLES VASEY, Esq., PRESIDENT, IN THE CHAIR.

The SECRETARY read the minutes of the previous meeting, which were confirmed.

The following communication was read from Dr. WILLIAM JELLY, of Madrid :—

Having had the opportunity of examining the mouths and teeth of people of many nations and tribes in different parts of the world, I am pretty conversant with all ordinary conditions, healthy or otherwise, found in the latter, and therefore believe the case I now describe to be unique. It occurs in the person of a female, *æt.* 25, of the Morisco-Arabic type, whose husband is a sergeant in the Civil Guards. She is healthy and handsome in appearance, and possesses a set of teeth remarkable for strength and regularity, but which, on closer inspection, appear to be marked with deposits of pigment in the form of zones, in a remarkably symmetrical manner, from the incisors to the last molars. I inquired if she were in the habit of chewing betel-nut, lime, or tobacco, but was answered in the negative. She had only one tooth decayed—a molar of the lower jaw of the right side, and from this I was able to ascertain that the pigment deposit did not traverse the dentine. The zones of deposit extended completely around each tooth, not being confined to one surface only ; and on examining each, found a small cup-like indentation on the enamel, but no sign of disruption. On inquiry I found that the mother and sister of the subject of this communication have the same deposits, but not so well marked ; the father and brothers have it not. I shall hope in time to be able to obtain and forward to the Society one of these coloured teeth. In the mean time I shall

be very glad to gather the opinion of your Society upon the same.

The PRESIDENT said that the communication contained a description of something that was evidently very unusual. He did not recollect having seen anything of the kind. If the appearance in question had been a zone depending upon an early abnormality in development of the tooth, it would have been seen in different positions; as at the middle of the incisors, and at the points of the canine teeth, &c. From the description, it would appear that the marks were round the set of teeth, and did not depend upon anything in connection with an early development. It would be satisfactory to get a specimen on which opinions could be formed.

Mr. DE LESSERT exhibited two upper incisor teeth, covered with a yellow pigment. He stated that they were taken from a patient who came to his house in Aberdeen, when he was not present. They were extracted by his assistant, and he said that all the other teeth were similarly marked. The patient had not chewed betel-nut, and he was an anti-tobacconist. There was no pitting in the enamel of the teeth, as described in Dr. Jelly's case.

Mr. SEWILL said that cases were often seen in which certain teeth on each side of the mouth were marked symmetrically. The case which had been read appeared to be of that nature, except that it involved all the teeth. The little pits of discoloration he should hardly call pigmentation. He did not know that pigment was ever found in the tissues of the teeth, excepting the deposit of colouring matter in caries, which might perhaps be so designated.

Mr. WHITE said that without a section it was difficult to say whether the staining on the teeth exhibited by Mr. De Lessert was merely on the surface or involved the dentine—a point it would be interesting to ascertain. It appeared to him that it was only on the surface of the enamel, and that it arose from medicine or some other staining agent.

Mr. COLEMAN had a specimen which had been sent to him to exhibit by Mr. Spence Bate. There was no history attached to it, and it was simply described as a tooth with an abscess in the dentine of the palatine fang. Such might probably be the

case, but it might also be a case not very uncommon in which the cavity was a foramen that had conducted a vessel from the side of the fang to the pulp, and that it had suppurated when the pulp itself suppurated. Of course, that could not be decided without making a section.

Mr. CHARLES TOMES said that he had purchased for the Museum, through the kindness of Mr. Charlesworth, a very remarkable specimen of an abnormal tusk from an African elephant. It was difficult at first sight to make out its real nature, which could not, indeed, be satisfactorily shown without obtaining some microscopic section. The members were probably more or less familiar with the results of injury to elephants' tusks. The elephants were often shot at and not killed, or were injured by the natives dropping loaded spears on their heads on their road to watering, by which means injury was often inflicted on the growing pulp of the tusk, sometimes producing all sorts of irregular stalactite-like growths, which more or less obliterated the pulp-cavity, but did not, as a rule, interfere with the growth of the main body of the tusk. At first sight it might appear that the tusk now exhibited was the result of some such injury; but there were one or two peculiarities about it which seemed rather to negative that idea, and to lead to the inference that the abnormality commenced with the very earliest development of the tusk. It would be seen that there was the appearance not only of two tusks, but of a great many more; and at the end there were depressions which corresponded apparently to the open ends of tusks from which they were growing in several places. Each had its pulp-cavity, and there was also a kind of pulp-cavity at the base of the central mass. He believed that the nearest analogy to the specimen was to be found in such an abnormality as he held in his hand, known as an odontome arising in horses' teeth. Of course, the mass had been moulded in the soft part, in pulp enamel organs, or the like, and had subsequently calcified. In like manner, he imagined that the tusk of the elephant had become malformed at its earliest starting-point, so that instead of starting from a single conical pulp, and proceeding in the normal manner to the formation of a single tusk, the pulp had a number of processes like that of a

molar tooth (which had a process for each cusp), and calcification had proceeded along each of them, so as to form a number of isolated tusks side by side, these being fused together by irregular deposits of dentine. It was impossible, however, to speak with any certainty on the point without the assistance of sections.

Mr. COLEMAN said he believed there was an illustration of a case of the same kind in Mr. Tomes's Lectures on Dental Physiology and Surgery.*

Mr. CHARLESWORTH said that when he first saw the specimen exhibited by Mr. Tomes in the hands of an ivory-merchant in the City, his impression was that the abnormality had resulted from an injury, probably inflicted by a bullet which had gone into the pulp-cavity. If the bullet struck the hard part of the tusk, it was certain to glance off, but if it struck the thin sheath of ivory which protected the dentinal pulp, it would go through it and lodge in the pulp, setting up disorganizations; so that there was no normal calcification of the pulp, as seen under ordinary circumstances, but a kind of stalactite formation. The difficulty, however, he felt was the fact that the diameter of the tusk was 10 inches. Mr. Tomes had set him right on that point, and drawn his attention to the fact, that if it had been formed in the pulp-cavity there would have been large lateral attachments, and there were no indications of such attachments in the specimen. He believed that Mr. Tomes's view was unquestionably the right one,—that the formation had not resulted from an injury by a bullet passing into the pulp of a huge tusk, but that the tusk must have begun in its present abnormal state. He hoped, however, that a section would be made through the large diameter of the mass, and also through one of the tusk-like processes, by which means it would be much more easy to arrive at a definite conclusion as to the real nature of the specimen.

The PRESIDENT said he believed that Mr. Charlesworth had some interesting specimens to exhibit.

* "Dental Physiology and Surgery." By John Tomes. Lecture IX., p. 183.

Mr. CHARLESWORTH said, that understanding that there would be no great pressure of papers for that evening, and that a specimen of abnormal ivory was to be shown, he thought that the members might be interested in seeing a large tusk which formed part of the famous importation of Siberian ivory that took place two years ago. For the last few years there had been an annual rise in the price of ivory, in consequence of which the experiment had been tried of making a large importation of Siberian fossil ivory. About sixty or seventy tons of fossil ivory had been brought into the market; the finest tusks fetched a very high price, almost as much as the best living ivory, but when the workers came to cut them up, they proved to be worth much less than they had realized in the market, so that the experiment had not been and was not likely to be repeated. He had been fortunate enough to secure some of the finest of the tusks, and to get them lodged in different museums, and that now exhibited was on its way to the South Kensington Museum. It was only a small one, but it was very good of its kind. Physiologically or functionally there was one point of great interest in the history of those tusks; namely, of what use were they to the mammoths? The tusk had two oblique curves, and carrying them on a complete spiral was formed. He could not understand how the mammoth could use such tusks, nor was their exact position in the head known positively. It was, of course, known that to a certain extent they followed the law of ordinary tusks of living elephants, but whether the remarkable bend went outwards, or whether inwards, or what was the exact position, it was impossible to say, and he was perfectly at a loss to conjecture of what use the tusks could be. The other specimens on the table were the productions of the Suffolk diggings. Mr. Charlesworth then gave an interesting account of the discovery of fossil dung found in the red-crag, and its conversion into a valuable manure by Mr. Laws, and said, that although for hundreds of years naturalists had collected fossil shells and fishes' teeth from the crag, no one had met with the teeth of land animals. Geologists were not surprised at that, because the crag was the ancient sea-bottom; but when the crag was extensively dug over, the diggers not

only found the teeth of fishes by millions, but the teeth of mastodons, rhinoceroses, hippopotami, deer, and tapirs, and a host of other animals, the remains of which geologists never dreamt of finding in that locality. And they were mineralized in the most beautiful way, quite unlike any of the fossil teeth from the ordinary Thames Valley gravels, or other deposits in which mammal teeth were found. Some of them, indeed, were literally worth their weight in gold. It was not unusual to give a digger a sovereign for the tooth of a tapir, and it was just the weight of a sovereign. The price of a mastodon's tooth was eight or ten guineas, about its weight in silver. As a matter of odontological science in relation to the teeth of extinct animals, the discovery to which he alluded was one of the grandest ever made in the history of geology. A new fauna had been discovered, and it was now known that at the time when the Suffolk Crag formed the bed of the sea the rivers carried down the carcasses of mastodons and other extinct animals into the sea, where they floated about until they became decomposed and sank to the bottom. The sharks and other fishes would, no doubt, devour the flesh. The bones seemed to have disappeared, but the teeth remained mineralized in a perfectly unique manner. He had seen nearly all the great museums in the world, from Boulogne to Mexico, but he had never seen anything so beautiful as the mineralization of the teeth from the Suffolk Crag. The most remarkable was that of the mastodon. When John Hunter first saw it he said it must have belonged to a carnivorous animal, because the crown bristled with pointed cones. It was now known, however, that the mastodon was no more a flesh-eater than the elephant. If they had only known it by the crowns of the teeth, they would have been altogether in the dark as to its food, and as to its being one of the true Proboscidae. The animal was first made known in America. He now exhibited the cast of a tooth of an American mastodon, from which it would be seen that the crown was traversed transversely by a series of prominent high ridges that were five in number, and they gradually wore down until the crown became almost as flat as that of the molar of an elephant. In the tooth of the English mastodon the crown was divided into

ridges, but between them there were supplementary cones, which always sufficed to distinguish the English from the American mastodon. Besides the teeth of land animals, there were the teeth of spermaceti whales and grampuses mineralized in the same manner. Seeing in the museum no vertical sections of the teeth of the spermaceti whale, he had brought with him a case showing the teeth of the living animals cut vertically and polished for comparison with the fossil ones. There was another specimen to which he also desired to call attention, namely, a copper bullet found lodged in the tusk of an elephant. Lead and iron bullets in such a position were common enough ; but this was the first occasion on which he had met with a copper bullet. Another case exhibited sections of the teeth of the walrus. It appeared that in the Suffolk Crag the mammoth and walrus existed. It would be admitted that no living walrus tusk was as large as that now exhibited ; the specimen was the first that had been found. The mammoth was known to be about three feet higher than the elephant ; it had been known for hundreds of years, and thousands of tusks had been examined by comparative anatomists ; but of the Suffolk walrus very few fragments had been discovered, and it might turn out that the specimen he exhibited was only a small one. All the tusks that had been found were curved or sickle-shaped, and very much compressed, so that the section was very different from that of the tusk of the living walrus. These were some of the great additions to odontological science, considered in relation to pre-Adamite times, brought about by Professor Henslow's discovery, of the conversion of stone into bread.

The PRESIDENT inquired whether the tusks of the mammoth referred to by Mr. Charlesworth were not found imbedded in the ice ; and whether the term "fossil" as applied to them was not a mere trade expression.

Mr. CHARLESWORTH said he did not know the exact circumstances under which the Siberian tusks were found. Some of them were undoubtedly found in the ice. The famous mammoth now at Siberia, having the hair and integuments still upon it, was so found. The flesh had been so well frozen, that when it

thawed the wolves and dogs fed upon it. He imagined that a large number of the imported tusks were taken from the frozen soil ; but those which were well preserved, and of which the ivory was comparatively valuable, were probably taken from the ice.

Mr. COLEMAN said that a specimen, showing a copper or gun-metal bullet in an elephant's tusk, belonging to Mr. Tomes, was in their museum. In that case there was a fistulous opening leading to the bullet, showing how much greater was the irritation set up in that than in the case of ordinary iron bullets.

Mr. CHARLESWORTH said there was no such opening in his specimen. There was disorganization in the pulp-cavity, but it was very slight.

*On the Attachment of Teeth. Part II. On the
Nature of the Alveolo-dentary Membrane. By
CHARLES S. TOMES, M.A.*

GENTLEMEN,

ABOUT a year ago I had the honour to read before this Society a paper upon the Attachment of Teeth, which dealt solely with that manner of fixation known as Anchylosis. It was my intention to read a continuation of that paper speedily, but the material requisite did not come into my hands, nor had I the leisure to seek it, till quite recently.

My paper will not, I fear, contain much that is new, save in detail; but it will be rather an attempt to put clearly before you what is known of the intimate nature of the means of attachment of mammalian teeth, a thing which I hope may be useful, inasmuch as some little misconception appears to prevail upon the subject.

The teeth of mammals are, in the great majority of cases, planted in sockets of bone, which fit them loosely, the intervening space being occupied by a softish vascular tissue, going by the name of the Alveolo-dentary Membrane. With it, in a diseased condition, we are constantly concerned; and we should do well to acquaint ourselves, so

far as may be, with its relations in health, so that we may be in a better position to understand its diseases.

But if we would fully appreciate its real nature we must not confine our views to the teeth of man, or even to those of mammals; a much clearer conception may be gained by starting a little lower in the scale. As distinguished from teeth attached by ankylosis or actual continuity of the hard tissues, we speak of teeth attached by membrane. Teeth attached by membrane may, again, be grouped into those which are attached by membrane without being situated in bony sockets, and those which are attached to the walls of bony sockets by the interposition of a membrane.

(i.) Attachment by means of membrane only.

This manner of fixation is best illustrated by the teeth of sharks, to the development of which I have been giving some little attention lately. For the present purpose it will suffice to say that successive rows of teeth are perpetually developed in the sheet of mucous membrane covering the jaws, and that as new rows are formed the old ones are constantly being cast off.

This is accomplished by the sliding or rotation of the whole mucous membrane over the surface of the jaws, and by its carrying the teeth with it. Consequently the teeth are attached solely to the mucous membrane, and not at all (directly) to the jaw beneath. Each tooth is formed from a

tooth-germ, which consists of a papilla-like dentine bulb, and of an enamel organ capping it. The dentine germ appears simply as an elevation of a part of the mucous membrane at the base of the jaw, without being at first any structural alteration.

Then it becomes differentiated in structure, and next, calcified over its apex: as calcification reaches towards its base, and the tooth is thus approaching completion, the mucous membrane immediately contiguous to the base of the papilla (there having thus far been no distinction of the one thing from the other, the two tissues blending completely one with the other) becomes fibrillated; and by the time calcification is complete, the tooth is held firmly in its place by bundles of strong fibres at one end attached to its surface, and, at the other, losing themselves in the mucous membrane adjacent to it.

The point to be kept in view is this: that the tooth is held in place by a fibrous membrane, the fibrous membrane being nothing more than that same tissue from which the dentine itself was developed, which has subsequently undergone this transformation. Starting from this, the simplest possible method of attachment, we shall possess a vantage-ground for investigating

(ii.) Attachment by the means of a vascular membrane to the bony walls of a socket.

If we take the jaws of a foetus at a period when

the jawbones are but little calcified, we shall find a state of things similar to that represented in fig. 1; that is to say, there is a good deal of space between the tooth-germ and the forming bone, and this space is occupied by tissue similar to and in no way divided off from, the formative organ of the dentine or dentine papilla.

In the further progress of the development of the tooth, this surrounding tissue becomes, as it were, squeezed thin between the bone and the rapidly-increasing tooth-germ, and it becomes finely fibrous in consistence. In this stage it is known as the tooth capsule, or investing sac of the tooth-germ; and it has been described with a minuteness of detail which tends to exaggerate both its importance and its distinctness of existence. It is nothing more than the whole of the connective tissue which intervenes between the tooth-germ and the bone, and the dentine papilla at its base blends completely with it, there being no line of demarcation between the two.

From this time forward, no substantial change occurs in the relations which the dentine papilla bears to the surrounding connective tissue or tooth-sac. If the tooth is one of persistent growth, the base of the pulp remains widely open, and the two structures are continuous over a relatively large area; if the tooth forms roots, the pulp narrows down to the dimensions of the apical foramen, but its connection with the soft

tissue outside is the same in kind, though less in degree.

This external tissue, this tooth-sac, is what becomes the alveolo-dentar membrane. The point which I have been striving to bring into prominence is, that it originated from identically the same tissue as the dental pulp, and that in all its ultimate differentiation it retains at one point—*i. e.* the apical foramen—a continuity with it.

With its history thus before us, it is easy to see what is implied by the statement that it is largely supplied by branches of the same nerves and vessels which are going to supply the pulp. Abundant branches are given off by both vessels and nerves before entering the base of the pulp, which run up between the tooth and the bone of its socket, and so supply the alveolo-dentar membrane (fig. 1).

This enables us the better to understand how a morbid condition of the one may be transmitted to the other; how a tooth, morbidly sensitive from its pulp being in a state of irritation, may be tender also in its socket,—a tendency that we know not to be due to active inflammation, but rather to disturbed innervation, because it disappears instantly upon the application of a sedative to the pulp; and my friend Mr. Turner, to whom I was mentioning these facts, suggested a further possible application of them, to the effect that it was quite possible that the destruction and

removal of the nerve of a tooth might predispose to inflammation of the alveolo-dentar membrane by throwing into it an increased flow of blood, there being no longer any circulation through the pulp-vessels.

The vessels destined for the pulp are not, however, its only source of blood; it receives a supply also from vessels perforating the bone around it, and from others which dip down from the gum. Its nervous supply is similar to its vascular supply.

Lest my paper extend to a greater length than would be desirable at such a meeting as this, I will bring it to a close by a brief summary of what the completed alveolo-dentar membrane is like.

It is a thin sheet of finely fibrous connective tissue, rich in blood-vessels and nerves, and not unlike the periosteum of a bone, save that it is quite without elastic tissue. Above, *i.e.* at the neck of the tooth, it bleeds insensibly with the gum; at the apex of the root, as before said, with the pulp. It occupies the whole space between the root of the tooth and the bone, and is therefore thicker in some places than in others, and it serves alike as periosteum to the bone and organic covering to the cementum. In other words, there is but one membrane for the two. The tooth has no "peridontium" separate from the "periosteum," as has been stoutly maintained by several authors,

who can never have seen a section with both hard and soft parts *in situ*.

As has been before mentioned, it is a fibrous membrane, its fibres, generally speaking, running across between the cementum and the bone; it is perfectly easy to trace bundles of fibres the whole way across, losing themselves at one end in the bone, at the other in the cementum. They do not by any means always run horizontally; more commonly the fibres pass obliquely upwards or downwards, and they never run quite straight across.

At the side nearest to the bone the alveolo-dentary membrane is precisely like a rather dense fibrous connective tissue, richly vascular; as it approaches closely to the cementum, its character, to a slight extent, undergoes gradual change, the fibres no longer being grouped in bundles, but forming a fine meshed network, well figured by Dr. Lionel Beale.

The fibrils of this network pass without break of continuity into the cementum, being often attached to little upstanding processes of that tissue of the same diameter as themselves, so that it cannot be doubted that they are calcified (figs. 3 and 4). When a tooth is extracted, the alveolo-dentary membrane is torn, the greater portion remaining behind in the socket, while a thin layer of the network remains adherent to the cementum, and comes away with it.

DISCUSSION.

The PRESIDENT said Mr. Tomes's paper was a very suggestive one, and he was glad to find that they were likely to have an advanced description of the early development of the teeth, from which alone advanced methods of treatment could be expected. In teaching his students he had long felt the want of a clearer conception of early development. The development from the sac (as given by Goodsir), the enamel organ, and the papilla, always presented to his mind many difficulties. According to previous accounts, when the tooth was erupted the sac and the enamel organ came to a termination, whereas it was practically known that the enamel received a positive addition to its substance after the eruptive stage. It was difficult to make a section of the enamel of a young tooth, the fibres being so much separated from one another ; but as the tooth advanced in age new material was evidently thrown out, between the columns of the enamel ; it became more dense and compact, and a section was more easily obtained. Mr. Tomes, in his early work, drew attention to that, and he mentioned that in making a section of a fully-developed tooth, it was almost necessary to put it in weak acid to develop the striæ and the columns.

Mr. TURNER said he desired to express the great pleasure with which he had listened to Mr. Tomes's paper, which had all the elements of a practical contribution. He had pointed out the relation of the alveolo-dental membrane to the nerve-pulp in the matter of hyperæsthesia, and also in the matter of circulation. Had he thought of the question in relation to replantation, or treatment by torsion in cases of irregularity ? He could not reconcile the treatment with the presence of two distinct membranes ; but if Mr. Tomes's theory were correct, as he presumed it was, there was a certain amount of reason why the treatment should succeed.

Mr. COLEMAN said that many years ago, on pathological grounds, he regarded the alveolo-dental membrane as a single membrane, but he could give little reason for his belief on other grounds, before studying the recent researches of Waldeyer. Mr. Tomes's description was the clearest ever given of the origin and formation of that membrane. Having paid some attention to the subject of transplantation and replantation, he would suggest that there was a better chance of success in the case of a rupture of a single membrane than in the case of a separation of two membranes which must afterwards unite. Mr. Tomes's remarks were very valuable in regard to the epidermal origin of enamel and the dermal origin of the dentine, cementum, periosteum, and surrounding structures.

Mr. SEWILL said that Mr. Tomes's researches, in regard to the development of the teeth, possessed a value which he had not mentioned, *i.e.*, that they entirely corroborated the researches of Legros and Magitot, who had written an elaborate account of the development of teeth in mammals, and had pointed out that the so-called dental sac was, at its origin, a part of the dentinal papilla, which was a portion of the development of the sub-mucous tissue. The practical results of Mr. Tomes's paper were very obvious and valuable, and would remove one difficulty in regard to teaching. If several anatomists who, having investigated the development of the teeth in different classes of animals, corroborated each other, their published accounts might be taken as exact. It appeared to him that the accounts of the development of the teeth by Mr. Tomes, Messrs. Legros and Magitot, and others, were as advanced as the accounts of the development of any other part of the human organism, and even more advanced than many. Some parts were much more complex than the teeth, and much more difficult to trace. Unless some great stride was made in microscopic science, he thought that they had now arrived at a point, especially after Mr. Tomes's researches, at which very little additional knowledge could be expected for some time to come.

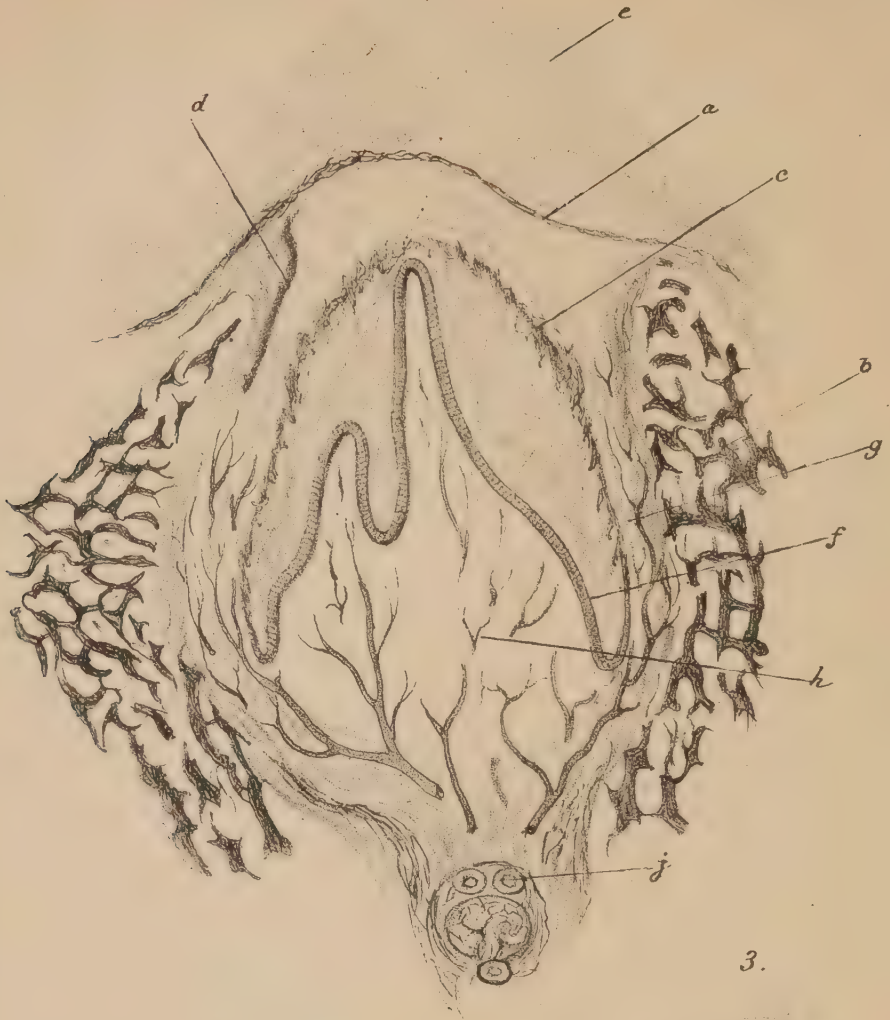
Mr. TOMES, in replying, said he imagined that in the operation of torsion, as in the case of extraction, the alveolo-dentar

membrane was torn across at a point where there was an entire absence of elasticity, and there was no reason why it should not unite as readily as in the case of a piece of finger sliced off and carefully put on. In reference to Mr. Sewill's observations, he remarked that Legros and Magitot had described the alveolar membrane in considerable detail, but the main points had been described before by other observers.

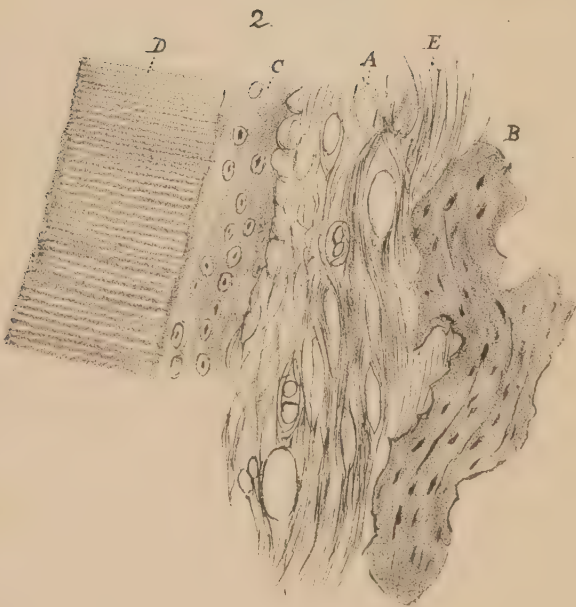
The PRESIDENT said the members would agree with him that their best thanks were due to Mr. Tomes for his excellent paper, and also to the gentlemen who had favoured the Society with casual communications, especially Mr. Charlesworth.

The Society was then adjourned to the 3rd of April, when a Paper, entitled "The Retarded Eruption and the Extinction of Wisdom Teeth.—Case of Abscess, with *Fistulæ* from buried inferior *Dens Sapientiæ* lying horizontally below the Alveolar Margin, &c.," will be read by Mr. FELIX WEISS.

1.



3.



4.



DESCRIPTION OF PLATE III.

FIG. 1.—TRANSVERSE SECTION OF THE JAW OF A FŒTAL CALF.

- a.* Deep layer of oral epithelium.
- b.* Bone of the jaw.
- c.* External epithelium of the enamel organ.
- d.* Remains of neck of enamel organ.
- e.* Oral epithelium.
- f.* Enamel cells.
- g.* Connective tissue, which goes to form the dental sac, and later becomes the alveolo-dentar periosteum.
- h.* Dentine pulp.
- j.* Vessels of jaw.

This figure shows very distinctly the point emphasized in the paper, that the vessels of the dental pulp and of the alveolo-dentar periosteum are derived from the same sources.

FIG. 2.—TRANSVERSE SECTION OF INCISOR OF A PIG IN ITS SOCKET. The fibres of the alveolo-dentar periosteum are seen crossing from the bone to the cementum.

- A. Alveolo-dentar periosteum ; inner reticular portion.
- B. Bone.
- C. Cementum.
- D. Dentine.
- E. Outer and more fibrous portions of alveolo-dentar periosteum.

FIG. 3.—MORE HIGHLY-MAGNIFIED VIEW OF THE CONNECTION BETWEEN THE NETWORK AND THE UPSTANDING PROCESSES OF CEMENTUM.

FIG. 4.—FROM THE CENTRE OF THE ALVEOLO-DENTAR PERIOSTEUM, where the fibres blend with the more reticular portion.

GENERAL MONTHLY MEETING.

3rd April, 1876.

CHARLES VASEY, Esq., PRESIDENT, IN THE CHAIR.

The minutes of the last meeting were read and confirmed.

The following gentlemen were nominated for membership :—

Mr. HARRY B. GILL, L.D.S., 62, Bow-road, resident.

Mr. GILBERT MALLET, Old Rectory, Newbury, Berks, non-resident.

The following gentlemen were elected members :—

Mr. EDMUND BINNS, L.D.S., 70, Linthorpe-road, Middlesborough, non-resident.

Mr. EDWARD READING, 117, Castlereagh-street, Sydney, non-resident.

Mr. GEORGE W. FIELD having signed the obligation book, was formally admitted a member.

The PRESIDENT announced the donation of six numbers of the Microscopical Journal from the Treasurer, Mr. James Parkinson.

Mr. CHARLES JAMES FOX said a patient had come under his care that morning at the Dental Hospital of London, whose case he had deemed of sufficient interest to bring before the Society. The patient had a most decided division of the lower jaw on each side between the right lateral and canine, and between the left canine and first bicuspid, the central portion containing the left canine and four incisors, forming a confused mass, half an inch lower and more forward than the two side

portions, which nearly approximated over and behind the central portion. There being no history of violence either by a fall or a blow, the present condition of the jaw, which had existed twelve months, could only be the result of disease, and on inquiry it proved that the man had been a severe sufferer from syphilis. He was a gardener, and said he was and always had been a very temperate man, otherwise it was possible that a fall might have caused the fractures at points weakened by necrosis. Knowing the interest Mr. Christopher Heath takes in such cases, he (Mr. Fox) had shown this patient to him, and he might, before sitting down, mention that at page 21 of that gentleman's work on diseases of the jaws they would find drawings which would fairly represent this case when the central necrosed portion was removed and the two sides had united. The patient was then brought in and examined by the members, and after he had withdrawn,

Mr. CHARLES WHITE asked Mr. Fox if it were his intention to treat the case mechanically. He had a short time since seen a somewhat similar case, where, from the result of a blow and subsequent inflammation, a portion of the inferior maxilla, to the extent of three-quarters of an inch on each side of the symphysis, had become necrosed and had exfoliated. In this case, the greatest relief was afforded by supplying a vulcanite frame supporting the missing teeth, and keeping in perfect apposition the two sides of the jaw.

Mr. OAKLEY COLES said he thought Mr. Fox's case was one of exceeding interest, not so much from the characteristics of the disease as from the situation in which the disease had shown itself. The central fragment appeared to be quite detached, and the necrosis to have commenced at the lower part of the jaw rather than from the upper part, and this was further borne out by the evidence that the gland on the left side was considerably enlarged and thickened, and there was also a fistulous opening underneath the chin. He had only seen one other case like it, and that was where the disease of syphilitic origin commenced in the gland, and produced a fistulous opening, and afterwards a piece of bone became necrosed. With regard to the treatment of such a case,

he did not know how far Mr. Fox desired to have a discussion upon it, but for his own part he considered it would be far wiser to leave the case alone until the necrosed bone and the teeth came away of themselves, rather than to attempt to remove them, as in the removal of the teeth there would be probably set up an amount of irritation that would involve a considerably larger portion of the jaw than was at present subject to the disease. Further than that, he believed that in old syphilitic cases if the patient were placed upon a course of iodide of potassium and the general health looked after, as soon as the bone came away there was very great effort for a reparative action, so that, as would probably be the case in the present instance, fibrous tissue would be formed affording a union between the two fragments of jaw, until artificial means could be used with far better result than by keeping the two halves of the jaw separate by a mechanical appliance. He merely threw this out as a suggestion based upon his own experience.

Mr. Fox said he should be exceedingly pleased to receive any hints from gentlemen present. He thanked Mr. Coles and Mr. White for what they had said ; but unless he saw reason to modify his view by what he might hear at the meeting, his own impression was that he had better remove the teeth that were projecting so much, and then wait until the sequestrum was ready to be removed. He would, as soon as possible after the removal of the teeth, make a plate to keep the parts in position, and hope for a union to take place, after the removal of the sequestrum at the proper time.

Mr. TURNER said it seemed to him that the cause of the division and approximation of the lower jaw was due to muscular contraction, the fragments being deprived of the keystone that kept them in position,—namely, the centre part at the symphysis of the lower jaw. If they allowed this amount of contraction to go on unchecked, when the sequestrum was removed it might be found that there was considerable difficulty in regaining proper power over the muscles. They knew very well that it was bad practice to hurry the removal of a sequestrum. If they tried to remove it by force, they would very

teeth. The true wisdom-tooth had a little portion of the posterior root broken, and the fourth wisdom-tooth might pass for an ordinary wisdom-tooth in every respect, the only thing remarkable about it being the absorption of a portion of the surface of the root from the diseased action which resulted from the formation of pus. Curiously enough, a year afterwards another case of the existence of a fourth molar in a lady's mouth was brought before him. The tooth had made its appearance just through the gum ; it was healthy and going on well, and he recommended her to leave matters as they were. Last week she came to him again, and he examined her mouth, and took an impression of it. He found that the supplementary wisdom-tooth was then decayed, as was also the true wisdom-tooth. He therefore advised her at once to have the supplementary tooth taken out, thinking that it would be a very small affair ; but, to his surprise, it did not prove so, for the tooth was a well-formed one. The anterior portion of its grinding surface was under the neck of the wisdom-tooth, and he had considerable difficulty in removing it : this was in a measure owing to the inability of his patient to open her mouth sufficiently wide to admit the forceps. The corresponding true wisdom-tooth on the right side was excessively large, and evidently composed of two germs merged into one. In the upper jaw the teeth had their normal form. He wished to present the teeth of both cases, and the impressions of the latter, to the Museum.

Mr. MUMMERY mentioned a very interesting case which had been brought under his son's notice about a year ago. The patient was a civil engineer who had been employed in Brazil, and had suffered considerably for about two years with occasional swelling on the right side of the lower jaw. The doctors there said it had nothing to do with his teeth, although he himself supposed it had. After a great deal of suffering he came home, and during the voyage he took a severe cold, which ended in suppuration at the angle of the lower jaw. The suffering became much more intense until it was relieved by a spontaneous opening, discharging pus, just below the angle of the jaw. Another opening shortly afterwards appeared

just below the first, the upper one partially healing. On arriving in England he saw Mr. Howard Mummary, and he was then in the following condition:—There was considerable stiffness in the jaw, which could only be separated to a very slight extent. The gum was very inflamed and thickened behind the second molar, and free lancing with excision of a portion of the gum gave great relief. Three fistulous openings existed on the neck,—one just below the angle, another about an inch above the clavicle, and an intermediate one which had nearly closed. These were discharging a thin pus. A probe introduced in the upper opening passed upwards and backwards in the direction of the lower wisdom-tooth, which, after lancing, could just be detected opening forwards and inwards. Although relieved from actual pain, as the patient was returning to South America, and the openings had not closed, it was deemed advisable to extract the tooth, and that was effected with great difficulty under chloroform, the alveolar wall being unusually strong, and the tooth lying very deeply. The extraction was at last accomplished with a pair of very strong double-bladed bayonet stump forceps. The tooth proved to be a large one, and of normal form. The patient was seen a fortnight after, when the fistulous openings had entirely closed, and he was quite free from pain.

The PRESIDENT asked Mr. Woodhouse how he extracted the tooth in the case he had mentioned.

MR. WOODHOUSE said he first tried a small pair of bent forceps with fine narrow blades, but the jaw had so little power of opening that he could not move the forceps. He then tried an elevator, but could not move the tooth at all. Next he tried a pair of bayonet forceps, and with them gave it a little motion, but could not raise it. He then took a pair of bent forceps similar to those he had first used, but which had been broken and re-arranged, and were very short in the blade; they were just long enough to go over the true wisdom-tooth and to pass down to the neck of the supplementary tooth, and he was thereby enabled to extract it after rotating it a little.

On the Retarded Eruption and the Extinction of Wisdom Teeth. Case of Abscess with Fistulæ from buried inferior Dens Sapientiæ, lying horizontally below the Alveolar Margin, &c.
By Mr. FELIX WEISS, L.D.S.

Mr. PRESIDENT AND GENTLEMEN,

RUNNING through the whole range of Dental Physiology, there are, perhaps, few subjects that present more interesting matter for investigation than the development and eruption of teeth; and if one tooth more than another may be cited as presenting an individual claim to be considered separately, it is the dens sapientiæ. Watching the gradual eruption of the permanent set, the changes that take place in the condition of the surrounding structures, and the provision that nature makes that each should ultimately assume its proper place, we are led to acknowledge the mighty Wisdom that rules our creation, and the fitness of all things for the purposes for which they were intended. Let us briefly recapitulate the conditions under which the wisdom tooth, as it is called, makes its appearance, and the results occasionally met with where this tooth cannot take up its proper position.

Dentition having proceeded to the eruption of the second molar, the maxillæ are now fully occu-

pied, and a pause takes place. We wait for the elongation of the jaw backwards, in normal cases from three to five years. If all be then favourable, another molar is added to the circle; but the eruption of this third molar is not generally unattended with pain. We have frequently a series of disturbances, the least of which is a certain amount of suffering to the patient, at times sufficiently distressing to call for professional attention; and upon examining more minutely the results, we perceive that the second molar standing in front and the termination of the alveolus behind, the wisdom tooth not having a predecessor, and its development being carried on beneath the base of the coronoid process, when the time arrives for its eruption, it has no space reserved for it, and in the generality of cases it cannot take its place without a certain amount of suffering, more particularly in the lower jaw: nor is this limited only to the part affected; it extends to the surrounding structures, causing the neighbouring muscles to become more or less rigid, and setting up inflammation, attended sometimes by suppuration, the pus not unfrequently burrowing around the periosteum of the jaw, giving very much the appearance of necrosed bone, and, indeed, occasionally leading to necrosis of the jaw. Nor is this the only annoyance resulting from the attempted eruption of the third molar. Frequently the tooth takes a different direction, and

remains buried in the alveolus, or even ascends the ramus of the jaw, or becomes impacted against the second molar. Such cases must be more or less familiar to you all, and are very explicitly recorded in Tomes's "Manual" and Salter's "Dental Pathology."

If we continue our observation, we shall also find that this particular tooth varies not only in shape, but also in size. On the right we may have a perfectly-developed molar; on the left a cubic-crowned tooth, resembling the lower bicuspid. But that which more than anything else distinguishes these strangely variable teeth is the irregular periods at which they are erupted, and that they are in many instances absent altogether. Feeling that some reliable statistics on this interesting subject would be desirable, and having failed to discover any record that can guide us to a true estimate of the number of wisdom teeth absent in a given number of cases, I some time ago began to draw up such a record. The plan I adopted is very simple. I commenced by excluding all cases under the age of 26, taking particular care that the wisdom tooth had not been extracted, and where any doubt existed did not register the case at all. I took down first the name of the person, as a guide for future examination, if necessary; then the age, followed by the present state of the mouth as regards the wisdom teeth; and lastly, remarks upon any abnormality

that might present itself. In private practice this is a longer and a more tedious investigation than any one unacquainted with the detail of an operation-room could readily believe; but it has this great advantage; you can refer to your list and vouch for the accuracy of your statistics. I am sorry that the number of cases is not so large as I hope eventually to be able to classify; and I may here remark that arrangements might be very readily made at our Dental hospitals to record such statistics. There are many points that I think might thus be satisfactorily elucidated. According to my observations,

Of 312 persons over 26 years of age,

152 had deficiencies of wisdom teeth;

29 had none at all;

44 had deficiencies in the upper and lower;

76 ,, ,, only;

32 ,, lower only.

21 with deficiencies were over 50 years of age.

In 312 persons, 304 wisdom teeth were absent.

It will readily be understood that, to obtain a return of any great value of persons having deficiencies of wisdom teeth in advanced life, a very large number of mouths must be examined, and the greatest care taken that our records are carefully compiled; for it is sometimes difficult to decide whether the tooth has been erupted and

extracted, or never erupted at all. As a rule, where the tooth has never been erupted, the gum will present a square appearance; but where it has been extracted, the absorption will have defined the ridge of the maxilla.

Before proceeding, I should like to refer you to two passages in Mr. Tomes's work on "Dental Surgery"; and I may here be permitted to bear testimony to the invariable accuracy that distinguishes that admirable manual. In the second edition, p. 224, we read:—

"The great variability in the size and the shape of the wisdom tooth in civilized races, its occasional absence, and the irregularity of the period at which it is erupted, may, when contrasted with its large size and regular form in the lowest savage races, be taken as an indication that the wisdom tooth is slowly disappearing, and that there is a strong probability that in future generations it will be normally absent."

Then at p. 208 we read: "I believe, when one description of tooth only is wanting, it will generally be found that the lateral incisor is the missing member. Perhaps we should except from this rule the wisdom teeth. They, however, are so extremely irregular in all respects, as compared with the other teeth, that we are seldom in a position to declare them absent, although they may not have appeared above the surface of the gums. But if the third molars are less frequently

absent than the lateral incisors, they stand next in the order of absentees.”

That the wisdom teeth are erupted late in life we have plenty of evidence to prove, but that they are sometimes absent altogether I am fully persuaded, and that they take the first place as absentees my late examinations seem to indicate. I have seen several mouths where the third molar has been cut after the age of 70, and in one case a patient had attained his 84th year. I have only been able personally to record a deficiency of laterals in four instances, and in two of these the teeth were cut later in life, after wearing artificial work.

I have particularly noticed that wherever any of the fourteen permanent teeth are absent, the wisdom teeth will be found to be missing also. In the table of deficiencies of wisdom teeth already quoted, I have registered two instances where the superior lateral incisors have never been erupted, and in both these cases the wisdom teeth are also absent, although the patients are over 30 years of age. I can mention another person, aged 40, in whose mouth the second bicuspid of the lower jaw is wanting, and in its place we have the temporary molar; while in both the upper and the lower jaw there are no wisdom teeth. A similar case is also entered where the temporary molars are standing on both sides, but neither in the one jaw or the other are there any signs of

the third molar. This lady's age is over 40. As I have said, in every case coming under my notice, where any deficiencies of permanent teeth exist, the wisdom teeth are also absent.

Several very interesting questions spring out of these investigations,—questions I should like to see this Society endeavouring to answer. May not the wisdom tooth remain through life unerupted? You will observe in various specimens, jaws where the teeth are ground down, giving every indication of years of wear, and where the subjects must have passed the meridian of life, and yet the third molar remains buried in the alveolus.

Again, may not the original tooth-germ be sometimes absorbed, leaving no vestige of its past existence? I am sorry that I am not in a position at present to bring forward many preparations to establish my views on this subject; but as far as those investigations have extended, I have no hesitation in stating that I believe such to be the case. In one lower jaw I had an opportunity of examining, the fourteen teeth were all perfectly formed; but there was no indication of a wisdom tooth ever having been developed. In another, the fourteen upper teeth were all thoroughly erupted, but no third molar could be discovered. I believe, Mr. President, that the extinction of the dens sapientiæ opens a field for much interesting research well worthy of the con-

sideration of the profession ; and I look with considerable interest to the remarks my paper may possibly elicit from the members of this Society.

In Dr. Darwin's "Descent of Man," after remarking upon the gradual disappearance of the wisdom tooth, the smallness of its size, and the late period at which it is erupted, he goes on to contrast the number of the fangs of this tooth among civilized people and the earlier savage races.

It should be borne in mind that this change is more perceptible in the upper than in the lower ; indeed, the lower wisdom tooth, where it is erupted, is usually of the normal size, and this will account in some measure for the disturbance frequently created by its eruption in that jaw more than the upper. The two fangs are certainly somewhat flattened and turned backwards, but in other respects the tooth has very little changed. In the upper, we have a gradual merging of the three fangs into one, and the size of the tooth, as I have said, is becoming smaller and smaller, until at length we very commonly find the upper *dentes sapientiæ* no larger than lower *bicuspid*s.

It was my intention to have brought before you this evening several cases of impacted wisdom teeth ; but as these cases bear a very strong resemblance to each other, I shall content myself by relating the particulars of one where the buried

tooth produced chronic abscess and fistulæ, and was found below the alveolar margin.

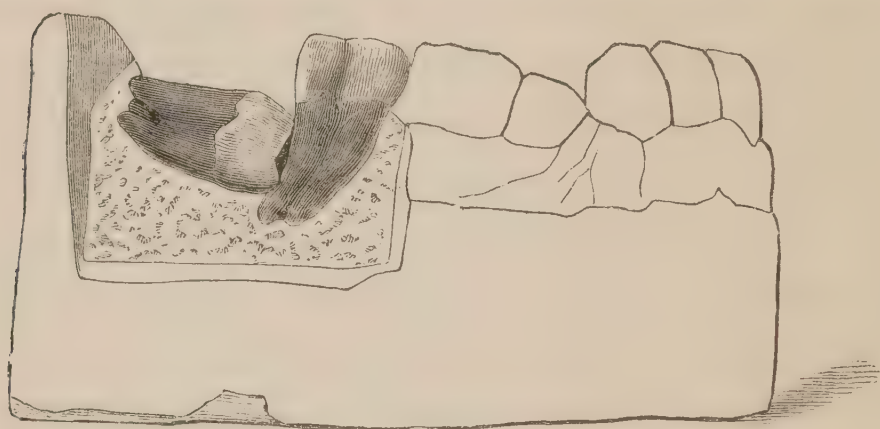
On the 16th of February, 1874, I was visited by Mr. S. H. B., *æt.* 43, a delicate and highly nervous gentleman, who complained of severe pain in the region of the inferior molars on the right side. He stated that he had suffered from a swelling in the sulcus between the cheek and the alveolus, which, after about ten days discharged pus, the opening then healing up. I made a careful examination of the mouth, but without discovering any traces of its past existence. The second bicuspid had been extracted, but the space was nearly filled up. Two molars were standing on this side, both perfectly sound, nor was there any indication of inflammation in the surrounding parts. One of the molars had a filling in the centre of the crown, but this was not likely to produce the symptoms complained of. The wisdom tooth, I observed, was absent, and I inquired whether at any time it had been extracted, but was assured that it had never been erupted. As the patient was much out of health I recommended that he should consult his medical adviser, and see me in a month or six weeks' time. In May, 1874, Mr. S. H. B. again called, having had a slight return of the symptoms, accompanied by a disagreeable taste in the mouth, the muscles becoming somewhat contracted. I again examined the mouth carefully, and found an opening oppo-

site the second molar, from which pus was exuding, and a slight swelling at the angle of the jaw. These symptoms pointed to necrosis, but the wisdom tooth being absent, I felt justified in suggesting the removal of the second molar, and making a search for the missing tooth. This, however, the patient was reluctant to consent to; it was therefore determined that he should pay Mr. Thomas Bryant a visit to ascertain whether there were any dead bone; but that gentleman was unable, without an operation, to give any opinion on the case, remarking that if the dentist had not sent the patient to him, he should certainly have sent the patient to the dentist; however, it was proposed that chloroform should be administered, and a thorough examination made of that side of the jaw. This visit was at first postponed, owing to family illness, and finally abandoned, the symptoms having subsided, the muscle recovering its normal elasticity, and the patient's health becoming much improved.

October 29th, 1875, I again saw this case. During the seventeen months that had intervened I had not had a visit from the patient; he informed me that during this period, somewhere about the month of May, the abscess had once more returned; that this time it had broken externally, giving him great relief, and the cheek had healed up again; that he had been free from pain until the first week in September, when he

went into the country for a holiday. Once more the old symptoms returned, the abscess again formed, broke internally, and in three places externally, the jaw becoming perfectly rigid. Mr. Barnett, of Leominster, where the patient was visiting at the time, was called in, and he administered ether, and made an examination of the jaw externally, but it seemed to all appearance healthy. The muscle was now so rigid that the mouth could only be opened about a quarter of an inch; but he managed to pass down a probe on the inside, and felt what I had all along believed to be the missing tooth buried behind the second molar. At the end of October the patient returned to London, and on the 29th, as I have said, he visited me. The mouth could now be opened about half an inch, and there was a fetid discharge both internally and externally, by three fistulous openings. I at once decided to remove the second molar; but this was a matter of no small difficulty, owing to the contraction of the muscle. Nitrous oxide gas was however administered, the mouth forcibly wedged open, and, assisted by my son and Mr. Gurnell Hammond (who happened to be accidentally in the house at the time), the tooth was turned over with a hawk's-bill forceps. A portion of the fang, however, was broken off, owing to the acuteness of angle at which it had to be extracted. The bleeding having subsided, and the patient sufficiently recovered, an examination of the mouth

was made, and there the wisdom tooth was discovered lying horizontally below the level of the alveolar margin, its masticating surface being directed forwards and downwards, proving that it



had been pressing against the fang of the second molar just removed. The patient was too much exhausted to submit to any further operation on this occasion; he was therefore directed to keep a plug of cotton-wool saturated with Condyl's fluid over the tooth, to prevent the gum from healing over it, and another appointment was made for the 5th of November; but on this occasion he was found to be in too excited a state to be brought fairly under the influence of the nitrous oxide gas. An examination of the mouth was, however, made; the tooth could now be fairly seen, and it appeared to be trying to raise itself to a perpendicular position. The patient had suffered but little since the last operation, the inflammation had greatly subsided, and externally the cheek was fast healing. From the second week in Sep-

tember to the present date, November the 5th, he had not been able to open his mouth sufficiently wide to take any solid food; it was therefore decided to postpone any further operation for the present, and it was not until the end of the year the mouth could be opened wide enough to continue the operation with any chance of success.

January 6th, 1876.—At length an appointment was made for this date, when Mr. Clover attended and administered ether and nitrous oxide gas. The tooth had by this time raised itself a little above the margin of the alveolus, and it was safely extracted, and also the piece of fang previously broken off the molar. The difficulty of removal will be more readily understood when the wisdom tooth is examined; for, growing at right angles to the fangs, is what appears to me to be an exostosed bony tumour, giving the appearance of a third fang, and owing to the position in which the tooth was placed adding considerably to the difficulties of extraction. It is to be regretted that the advice given in May, 1874, was not taken, and the molar tooth then extracted, as much pain and anxiety would have been spared; it must also be borne in mind that the patient was of so nervous a temperament that even the most ordinary examination of the mouth could not be suc-



cessfully performed unless he was placed under the influence of an anæsthetic.

February 18th.—All the disagreeable symptoms have now entirely subsided. Four small pieces of bone have come away, and the gum is gradually closing over. The fistulæ in the cheek have also healed, and the tannic acid and chlorate of potass mouth-wash he was directed to use has been discontinued.

Allow me, Mr. President and gentlemen, to thank you for the kind attention you have given to these imperfect remarks. I fear my paper will be considered more suggestive than exhaustive; indeed, on some points I have avoided dwelling, but I will not conclude by making excuses. I look to the experience of this Society to fill up the blanks I have left open, to take up the threads I have unavoidably left unfinished, feeling assured that you will always encourage every attempt honestly made, however imperfectly it may be carried out, to bring forward the results of personal observation, or to record the fruits of individual experience.

DISCUSSION.

Mr. COLEMAN said that the paper opened up many subjects for consideration, especially in relation to views such as had occupied the attention of Mr. Darwin and Mr. Herbert Spencer. As bearing upon the second portion of the paper, he might perhaps mention two cases which he had never published, but which were extremely interesting. The first occurred in a lady past middle age. She had been attended for abscesses at and below the angle of the lower jaw on the right side; and Sir James Paget, under whose care she was, whilst examining the jaw for dead bone, struck against something from a quarter to half an inch below the surface, which appeared to him harder than a piece of necrosed bone. Such was also his (Mr. Coleman's) opinion, and it was resolved that an attempt should be made to remove what would most probably prove to be a tooth. An incision was made, and after very considerable difficulty—for the bleeding was great—a view was obtained of one of the cusps of the right wisdom tooth impacted in the bone, from which pus as well as blood welled up. The bone was, as well as it could be, cut away round the margin of the tooth, and eventually, after considerable difficulty, the tooth removed in two portions; it had lain almost horizontally across the jaw, with the crown pointing pretty much in the direction of the masseter muscle. The second case occurred not very long after the first, and in the mouth of a gentleman acquainted with the former. The patient had suffered for twenty-four years, and had been under the most eminent surgeons, and had been treated for disease of the bone, having even had the lower jaw trephined, with the prospect of opening an internal abscess. Unfortunately, the trephine never hit upon the impacted wisdom tooth. In the operation which he performed he was somewhat guided by experiments that had been then recently carried out by the Committee appointed by the Odontological Society for the investigation of the merits of nitrous oxide, and with Mr. Clover's aid nitrous oxide was first administered, under which a free incision was made, well dilated with the finger, and down to the bone, and the pa-

tient allowed to recover from the nitrous oxide, and wash the mouth till the bleeding had almost entirely ceased. In this way, as he had a weak action of the heart, an immense advantage was gained over the previous case, in which chloroform had to be maintained for nearly two hours. Chloroform was then administered, and with no very great difficulty, with the aid of an elevator and a pair of forceps, the wisdom tooth was extracted. In the first case that he had mentioned, the patient got rapidly well; but in the second case, recovery was very slow, and though the operation was performed four or five years ago, there was still very considerable thickening about that part of the jaw.

The PRESIDENT said he once extracted a lower bicuspid which had developed backwards, as if it had run along under the roots of the molar. It was not seen until all the other teeth had been removed, and an artificial set had been worn for some two or three years. The paper which had been read pointed to the importance of all those holding appointments in hospitals making, as far as possible, records of the patients who came before them. He often thought with very great pleasure of the first statistical tables collected by Mr. Tomes of cases at the Middlesex Hospital, which had in many ways proved so valuable.

Mr. CHARLES TOMES said, in the case of one of the higher monkeys, such as a gorilla, the third molar tooth was in every respect well developed, with a crown on which the cusps were arranged according to the typical pattern, as respects its cusps, of an upper or lower molar. Further, instead of its being cut very late and at an uncertain period, it was generally cut before the attainment of sexual maturity, or before the animal had cut its large canine teeth. In the lower races of mankind, too, the wisdom-tooth was a large functional tooth, and preserved the characteristic arrangements of cusps. On the other hand, among more civilized races it was quite exceptional for the wisdom-tooth to be a characteristic molar of the upper or lower jaw. That was one of the things which pointed to its gradual disappearance. If in any group of animals obviously united by descent any organ was gradually disappearing, it would be

found that that organ was variable. An organ which was in full use did not vary much ; the causes grouped by Darwin under the name of "Natural Selection" prevented its doing so ; but as soon as it was brought under the level of functional activity it became variable. He had had in his own practice a case which he would like to mention. A patient had suffered most intense neuralgia in the eye-ball, the pain coming on with very distinctly marked periodicity, at nine at night and three in the morning. There were no decayed teeth on that side of the mouth, but the upper wisdom-tooth stood very nearly horizontally, its masticating surface looking outwards. That was the only thing abnormal about it, and he did not at the time exactly see why that should cause such intense neuralgia. He extracted the tooth, and its position having been peculiar, he made a sketch of it. There was no return of the neuralgia, but about a year afterwards the patient came back, and very near the same position there was the cusp of another tooth, and in another year an additional wisdom-tooth had appeared, being almost in a normal position. It was vertical, but inclined a little bit backwards from the other teeth. There was no recurrence of neuralgia, and no reason for interfering with the tooth. He knew of another instance where a buried tooth for a length of time caused no irritation. The patient was sent to him not long since on account of a fistulous opening and obstinate discharge, although the mouth was edentulous. The patient declared that the discharge had never existed prior to her teeth having been taken out. He enlarged the fistulous opening very freely with potassa e. calce, and on a subsequent occasion, when probing it, he felt something hard, the crown of a tooth, which turned out to be a canine lying very nearly horizontal. Its development had been interfered with by its unusual position. The patient was over 60 years of age, and she declared it had never caused the smallest inconvenience before the extraction of her other teeth. She also said she had had a regular set of teeth, though it was not a supernumerary tooth, but had all the characteristics of a canine. The case was instructive as showing how a patient's own statements might often mislead.

MR. MUMMERY said, in the course of an extensive examination of skulls he included 439 of various African tribes. Among 141 examples from the powerful races, he found not one solitary instance of deficient third molar. Moreover, among the vigorous Dahomeans two cases occurred of a fourth molar on each side of the upper jaw, another case of right upper fourth molar—all perfectly developed, and three cases of malformed fourth upper molars ; in five other instances, supplementary bicuspid and canines. On the other hand, among the feebler tribes—ill-nourished, and subject for generations to the predatory attacks of their powerful neighbours—not a single instance of supplementary teeth occurred, and the third lower molar was absent in the proportion of 10 per cent.

MR. TURNER said this question of the gradual extinction of the wisdom teeth was one of considerable interest. It appeared to him that the subject was somewhat mixed up with that of general physical development. The notion was certainly gaining ground that the wisdom tooth was disappearing and becoming smaller.

DR. FIELD asked Mr. Weiss what was the general physical and osseous development of the 312 cases which he had tabulated.

MR. BUCHANAN asked if any member present had ever met with a case where the first molars had been extracted under the age of 14, and the wisdom teeth had all been well developed.

MR. C. WEST said he had invariably found that wherever there was a well-formed dental arch there were well-formed wisdom teeth ; but where there was a general deterioration about the physical structure of the patient, there was an abnormal appearance of the wisdom teeth.

MR. TURNER said he himself had an anterior molar extracted when he was very young, and he had never had on that side a wisdom tooth. Since he was 14 years of age the second molar had also been extracted.

The PRESIDENT said he had often observed that extraction of the anterior molar facilitated the eruption of the third tooth.

Mr. WEISS, in reply, said it might be asked why, in the case he had cited, an attempt was not made to save the molar tooth. Unquestionably that would have been the more correct mode of proceeding could the position of the wisdom-tooth have been correctly ascertained; but buried as it was in the alveolus, the patient being of a very excitable temperament, no proper examination could be made without administering an anæsthetic—a proceeding the gentleman very much disliked. In support of the statement that whenever any of the permanent teeth are absent the wisdom-teeth will generally be found to be missing, they had several models before them. One of a woman 26 years of age, who had no lateral incisors, and the wisdom-teeth both in the upper and in the lower jaw were also absent. In another case, the second bicuspid of the lower jaw were absent, the temporary molars taking their place, and there was no indication of the wisdom-teeth, although the lady was over 40. He knew a family the several members of which were distinguished not only for their intellectual culture, but also for their height and muscular development. The grandfather had one of the finest forms ever bestowed upon man, and they have the clearest testimony that all his teeth were erupted. The son—a viscount—was also an exceptionally fine man, with a magnificent set of teeth. In the lower jaw the wisdom-teeth were well developed and perfectly regular, but in the upper, on the right, that tooth was absent, and on the left a very diminutive tooth, no larger than a lower bicuspid, stands. The grandson was now 37 years of age, and had no wisdom-teeth in the upper jaw, and those in the lower were somewhat smaller in size. It could hardly be said in a case like that that those results were due to a want of nourishment. As far as he could arrive at any conclusion, the existence of the wisdom-teeth depended more upon mind development or civilization than mere muscular strength. The subject, however, was a very speculative one. One fact, however, appeared to be pretty well established, that the wisdom-tooth was gradually disappearing.

The PRESIDENT, after according thanks to Mr. Weiss for his paper ; to Mr. Fox, Mr. Woodhouse, and Mr. Mummery for their communications ; and to the Treasurer for his donation to the Library, adjourned the meeting to Monday, the 1st of May.

ODONTOLOGICAL SOCIETY OF GREAT BRITAIN.



The following Application for Membership has been laid before the Council :—

Mr. JAMES EDWARD MURPHY, L.D.S., 2, St. James's Street, Derby, Non-resident.

GENERAL MONTHLY MEETING.

May 1st, 1876.

CHARLES VASEY, Esq., PRESIDENT, IN THE CHAIR.

The minutes of the last meeting were read and confirmed.

The following gentlemen were nominated for Membership:—

Mr. JOHN CARTEIGHE, Junr., L.D.S., 1, Stratford-place,
Camden-square, resident.

Mr. ROBERT HALL WOODHOUSE, M.R.C.S., L.D.S., 1,
Hanover-square, resident.

Mr. ALEXANDER CORMACK, L.D.S., 1, George-square,
Edinburgh, non-resident.

Mr. MATTHEW FINLAYSON, 161, Constitution-street, Leith,
non-resident.

Mr. WILLIAM BOWMAN MACLEOD, M.O.C.S.E., 43, George-square,
Edinburgh, non-resident.

Mr. MALCOLM MACGREGOR, M.O.C.S.E., 20, Queen-street,
Edinburgh, non-resident.

Mr. CHARLES MATTHEW, M.O.C.S.E., 59, Queen-street,
Edinburgh, non-resident.

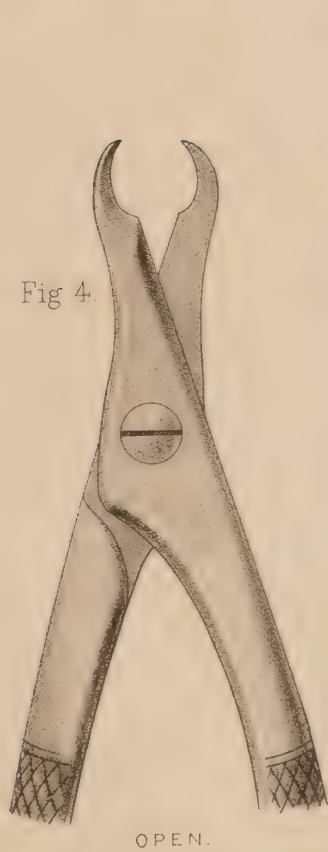
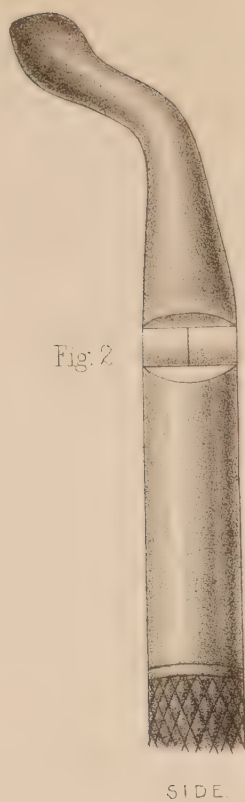
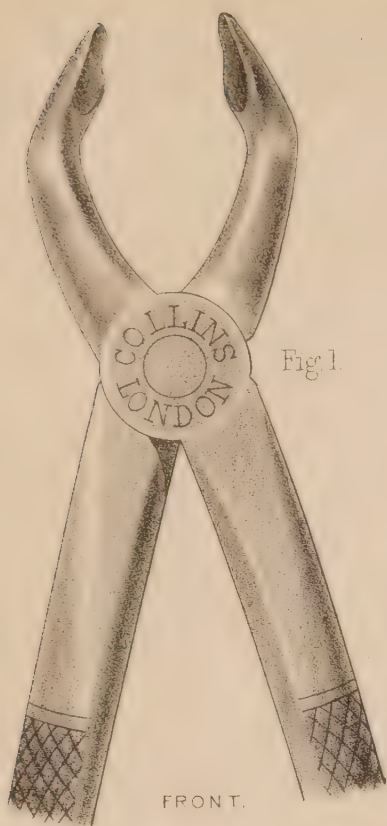
Mr. JOHN E. WATSON, 64, Rue Basse du Rampart,
Paris.

The following donations to the library were announced.
(1.) Quain's Anatomical Plates, coloured; presented by Mr.

Edwin Saunders. (2.) "Handbok Farmakodynamik och Farmakalogi," by Dr. C. J. Meyer; presented by Mr. A. Thornequest.

Mr. HUTCHINSON said his "casual communication" was a very simple one, and he would not have deemed it worthy to be brought before the Society had he not met with some really difficult cases, which, by the aid of the instruments he was about to show, he had been able to conquer. Those instruments were simply forceps. The first one (Figs. 1 and 2) was for the extraction of the lower wisdom-teeth, where, instead of lying vertically in the lower jaw, the tooth was almost horizontal. He would not attempt to describe the forceps, as the members would see them for themselves. He would hand them round, holding a wisdom-tooth which he had obtained from the extracting-room downstairs. That was the only instrument about which he ventured to claim any originality. His idea had been carried out very faithfully by Mr. Collins. From the wide opening of the blades of the forceps (see Fig. 1) the operator was enabled to see very perfectly the position of the wisdom-teeth, and also very easily to go round the back of the second molars. The other forceps (Fig. 3) which he wished to bring before their notice were only adaptations of already existing ones. They were for the extraction of upper molars, when the crown was very much broken down. The blade for the palatine root was somewhat similar to Mr. Coleman's adapted forceps, but had in addition one horn on each side, which grasped the neck of the tooth. He had found them very useful, not only for extracting broken-down upper molars, but also whole teeth. The last instrument (Figs. 4 and 5) was one for separating the fangs of an upper molar into two or three portions. One very often met with cases where the crown had been entirely broken off, and the roots were left, very much buried in the alveoli, so that there was very little grasp either for a horn forceps or even for a root-forceps. It was also often found desirable to be able to split the root. This was usually done by driving up a spear-shaped elevator and twisting round, or else by cutting forceps such as

Plate IV.



Mr. Harding's. The one he now brought before the notice of the Society was intended to go up between the bicuspid and the second molar, or between the molars, and to split the palatine fang from the two buccal fangs; and then, in most cases, it was easy to extract the two buccal fangs as well as the palatine fang. He would not venture to describe the instruments, as probably his powers of description would only cause him to complicate the matter,—the instruments could speak for themselves. In most instruments for splitting up the fangs of upper molars the idea was to separate the two buccal fangs, and it very often happened that the palatine fang was split. By his instrument the palatine fang was separated from the two buccal fangs, and all three were left perfect, and thus were much more readily extracted. The object of the two blades passing one another was, that when they were open to the extent necessary to grasp the palatine fang of a molar, they might not encroach upon the bicuspid and second molar, as they would do if the blades had to open much wider. They were made scimitar-shaped, so that they might not slip down off the palatine fang, but might grasp it and cut through it, very much like a pair of bone forceps.

The PRESIDENT said he was somewhat interested in the observations of Mr. Hutchinson; because, the older he became in practice, the less he employed the forceps when he had a difficult case to deal with. Many years ago, whenever a difficult case came in his way, he used to have a new pair of forceps; and whenever he was unsuccessful, he thought it was because he did not possess the right kind of forceps. As time went round, however, he got to be somewhat handy with the elevator, and he generally overcame almost all his difficulties with that instrument. It would be interesting to know if that was the general experience of practitioners. He remembered one case that was brought to St. George's Hospital, of a man who was almost dying from suffocation. He had very extensive swelling about the neck. He was just like a child with croup. The surgeon, the week before, had performed tracheotomy to give him relief. The surgeon was a gentleman whose attention had been frequently drawn to the irritation

arising from bad teeth, and he left word for the dentist to see the patient. He (the President) felt with his little finger, and noticed a number of roots along the lower jaw of that side, which he removed with a small elevator ; and he had often thought how such a case would have puzzled him in his earlier days, when he would not have known what sort of forceps to use. He constantly found himself resorting to the elevator under difficulties of this kind.

MR. TURNER remarked that however skilful people might be with the elevator, it was often a great thing to possess the means for dividing the three fangs of an upper molar roct, and the instrument exhibited by Mr. Hutchinson appeared so well adapted to that end, that he (Mr. Turner) would be much surprised if it were not generally adopted.

THE PRESIDENT drew attention to a model of the mouth of a child of only four years and three months, who came to his hospital with a bicuspid on the upper jaw, the crown of which was erupted through the gum, but was loose, and causing a great deal of irritation. He removed it, and found that it was very little more than the crown. He thought it a very interesting case from appearing at such an early age. He had not seen a case of the kind before. It was evidently an arrest of development of the root.

MR. WEST asked the President whether he considered the eruption of the bicuspid due to a blow or fracture ; he asked the question, because, some time ago, in his hospital practice, a child was brought to him with a portion of the outer plate of the process of the lower jaw fractured, and the pieces being removed from time to time, the deciduous teeth were also removed. Ultimately the crown only of a permanent tooth appeared through, and likewise had to be removed, as in the case the President had described.

THE PRESIDENT said there was no such history in his case ; he was quite alive to cases of fracture and injury. On one occasion there happened to be at his hospital two cases of fracture of the lower jaw ; and on seeing them, he said to the house-surgeon

that one would be out of the house in a very few weeks, while the other would remain there for months. He made that statement for this reason. The patient in the one case being a boy, about eight years of age, and the fracture was just at the symphysis of the lower jaw, and the permanent teeth were developed. The other patient was about five years old, and the fracture was just where the canine tooth should be; and he knew that the crypts containing the permanent teeth were injured, and that they would very likely be thrown off. It turned out just as he anticipated. Cases of fracture at so early an age were rare, and both Mr. Cæsar Hawkins and Mr. Tatham, the surgeons in each, admitted to have seen very few indeed; and yet on that occasion there happened to be two such in the hospital at the same time. He (the President) thought that, as a rule, when the crypt was broken into or injured, the permanent teeth would be thrown off.

Mr. RANGER said he knew of a case at St. Thomas's Hospital of fracture of the lower jaw, in a little girl three years old, who was run over by a cart.

Mr. TURNER said some time ago he saw a case at the Middlesex Hospital, of fracture of the lower jaw. The child had fallen from a second-floor window; and not only was the lower jaw fractured, but the interior portion of the alveolar arch was knocked backwards and inwards into the mouth. He brought the lacerated portions into position as well as he could, and the patient got quite well. He saw the child a short time ago, and the upper permanent teeth were cut; the upper incisors, and one lateral, had come into position very nicely. The fracture in the lower jaw was very long in healing up, and, remembering a case mentioned by Mr. Vasey, of retarded union being caused by the crown of a permanent tooth coming between the surfaces of the fracture, after some time he probed through a sinus which had been established just under the base of the jaw, in a line with the position which would have been occupied by the permanent canine, and in the course of a little time he was enabled to remove the crown of that tooth, when the case healed rapidly.

Mr. MOON related a case of fracture, which was treated with Hammond's wire splint, which proved perfectly successful. In another case where there was fracture of the lower jaw, the upper teeth were driven upwards into the jaw, separating the external and internal alveolar plates. In that case, the dresser crushed the plates together, and the teeth came down afterwards, especially the canine teeth, perfectly well.

The PRESIDENT asked Mr. Moon if in that case he considered the crypt had been broken into.

Mr. MOON said the crypt had not been broken into. The teeth were erupted, but they were driven into the jaw.

Mr. SEWILL had the pleasure of bringing a case before the Society, *à-propos* of that communicated by Mr. Hutchinson. A gentleman with a fine massive set of teeth had been for some time suffering from neuralgic pain, especially in and about the right ear. On examining his mouth, the lower wisdom-tooth of that side was discovered lying almost horizontally, with its masticating surface so directly opposed to the posterior surface of the second molar, that it was impossible to ascertain, by the probe, whether either or both were carious. Cold water, however, gave evidence of an exposed pulp. The removal of the wisdom-tooth, although the right treatment, was, from its abnormal position, an impossibility, and he determined to remove the second molar, and then if necessary, the wisdom-tooth; both, however, came out together, and then was seen a large cavity with exposed pulp in the posterior surface of the second molar, where the crown of the wisdom-tooth had impinged upon it. It was a case showing the difficulties encountered in removing the wisdom-teeth. The teeth embedded in plaster, in their exact relative positions when in the mouth, were shown to the meeting.

Mr. TURNER showed a dilacerated upper incisor; the fang of the tooth had been bent backwards on the crown, tearing asunder the anterior part, as seen in the diagram. The upper margin of the rupture had carried with it a portion of enamel. The peculiarity in this case was, that while the larger pulp-cavity with the



withered pulp was visible from behind, the anterior aspect of it was secluded by a wall of bone, which seemed to have been formed after the accident. There was no history of violence which could lead to any direct inference as to the cause of the deformity. A model of the mouth showed the crown of the tooth deflected downward and backward, while the upper margin of the fissure protruded beyond the gum in front, as if a portion of necrosed temporary fang had remained *in situ*, and driven the permanent tooth out of position.

Antiseptic Dental Surgery. By ASHLEY BARRETT,
M.B. Lond., M.R.C.S.

MR. PRESIDENT AND GENTLEMEN,

When Prof. Lister, of Edinburgh, introduced what was termed a novel method of treating surgical cases, he entitled this process "Antiseptic Surgery." It may be thus briefly described:—The wound, whether caused by accident or the surgeon's knife, was cleansed with water and was then coated with a mixture of carbolic acid and oil. This antiseptic dressing was renewed from time to time till the healing process was completed. It was asserted that wounds so treated healed, as a rule, by the first intention, and generally without suppuration. This desirable result was said to follow from the use of the carbolic acid; which, according to the theory, destroyed those atmospheric germs which, when in contact with the wounded surface, had they remained in a state of vitality, would have caused suppuration and destruction of tissue. These facts I have stated as evidence that by the surgeon carbolic acid is used for its antiseptic properties. Whether it be true or not that septic germs, as they are termed, are destroyed and rendered

innocuous by the acid, it yet remains a fact that this substance has the property of preventing putrefaction in organic substances otherwise prone to decomposition. This I have seen demonstrated by the late Dr. Letheby, by whom a piece of raw flesh had been impregnated with the acid; in the meat so prepared no putrefaction occurred after exposure to the air for some weeks in summer. Now it is this faculty possessed by carbolic acid of preventing decomposition, that gives it to the dental surgeon its extreme value. To me it appears that the most potent argument against the use of arsenious acid for devitalizing purposes is that the dental pulp when dead is liable to putrefy. It is, I am aware, asserted that arsenic itself has such powerful antiseptic properties that the nerve once impregnated with it undergoes no subsequent septic change; yet I do not think this can be relied on.

The plan which for the last few years I have adopted, with such success that I shall be glad to know it is more widely practised, is thus: after the application of caustic, what remains of the dead nerve (left not longer than two or three days lest it putrefy) is cleared out of the tooth with a barbed instrument. In this condition the devitalized pulp, which for not more than three or four days has been under the influence of arsenic, gives forth no odour, and is quite free from putrefactive change. Now let the pulp-

cavity and the interior of the fangs be filled with wool dipped in carbolic acid, over this may be placed the permanent metal filling. Thus we hold the organic particles left inside the tooth, the remains of the dental pulp, *in statu quo ante*; for although dead, what remains of the nerve is not putrescent.

If the use of arsenic be not followed by that of carbolic acid, I think there is great probability that the particles of nerve remaining shut up within the tooth will putrefy and cause further mischief.

But yet another condition exists in which good results from the use of carbolic acid. I refer to those cases in which periodontitis of a chronic character has existed; but, in order that I may express my views more clearly, I think it well to state briefly what to me appears to be the pathology of periodontitis. The course of events leading to the latter condition is somewhat complex: first we have the dental pulp irritated by advancing caries; then the pulp succumbs to a sharp attack of destructive inflammation and loses its vitality. Until the happening of this change, the patient suffers perhaps acute pain, and joyfully welcomes the relief from suffering which attends the death of his enemy; but the latter unfortunately is sometimes stronger in death than during life, and more apt then to cause trouble of a graver kind. The dead pulp

putrefies, evolves sulphuretted hydrogen and carbonic acid gases and the various products of decomposition. If the pulp-cavity be opened so that these gases may escape into the mouth, no harm is done, the patient notices a nasty taste, and there the matter ends; but let this opening through the walls of the pulp-cavity have become closed through a particle of food, or by a filling of the dentist, or it may never have existed, then does the dead pulp evince its power for evil: the gas evolved during its decomposition, unable to escape into the mouth, forces its way through the openings at the end of the fangs into the socket in the alveolar process. Along with the gas particles of putrid nerve are extruded; and, in fact, a process of septic inoculation is actually being carried on. The result, of course, is inflammation and suppuration around the fang of the tooth, the formation of an abscess in the alveolar process; eventually, perhaps, necrosis of parts of the maxilla. The inflammation may be subacute,—then we find a gum-boil coming and going, the tooth sometimes being very tender and at other times less so; but in all cases of periodontitis we have one state which is constant, that is, the locking-up within the tooth of putrid nerve.

And I think a great step is made in Dental Pathology, now that we are able to assert with confidence that, *whenever any of the signs of*

inflammation outside the tooth are present, they are caused by putrefaction going on within ; that a tooth is never tender on pressure or tapping without containing a putrefied pulp ; and that the gum-boil is evidence of chronic periodontitis, which latter is caused by escape from the tooth of particles of decomposed nerve ; the death of the latter having resulted from antecedent caries.

This then being the pathology of Periodontitis, whenever we find it existing, we can, it appears to me, relieve it only in two ways. Firstly and foremost, by making an opening through the walls of the pulp-cavity, so that the products of decomposition may escape into the mouth, instead of into the socket through the fangs. Secondly, by mopping out the interior of the tooth with carbolic acid, and thus again with this useful agent we may effect good ; but, as a rule, a tooth requires three or six months of treatment with carbolic acid, and temporary plugs of wool, ere a permanent filling can be inserted. In fact, a channel for the escape into the mouth of putrid emanations should be kept open until they cease to be evolved.

Gentlemen, I thank you for the honour you have done me in listening to these remarks, in which I have tried to advocate the utility of carbolic acid, in *firstly* preventing putrefaction of the dental pulp, after being devitalized

by arsenic; and, *secondly*, in arresting putrefaction of the dental pulp when once established, and so directly curing periodontitis; and I can only hope the importance of the topic may induce you to overlook any want of originality that may exist.

DISCUSSION.

Mr. MOON said that Mr. Barrett had advocated a method of treatment that had been followed by some practitioners for many years past, with a fair share of success ; but there was one point with regard to the pathology of periodontitis as to which he differed from Mr. Barrett. The author had said that there never was tenderness of the teeth on pressure without the presence of putrefaction ; but he thought there was such a thing as sympathetic tenderness, which accompanied inflammation of the pulp. When the pulp was violently inflamed, a tooth might be tender. When the pulp had altogether lost its vitality, that tenderness would pass away, and under the antiseptic treatment might not recur.

Mr. HENRY said he had listened with much interest to Mr. Barrett's Paper on the antiseptic value of carbolic acid ; he had advocated in a recent Paper the use of that agent, especially with a view to the preservation of the pulp. There could be no question that carbolic acid was perhaps the most valuable agent that had ever been introduced into dental practice. He must, however, demur to Mr. Barrett, in the idea that a tooth could not be tender, and, indeed, excessively so, without putrefaction of the nerve taking place ; for within the last two months he himself had to lose a large double tooth which was most exquisitely sensitive to the touch ; but, on splitting it open after removal, there was no putrefaction of the pulp to be detected. So intense was the sensitiveness of the periosteum, that with a great deal of regret he determined to lose the tooth. The same tenderness had occurred in one of his lower incisors on two or three occasions ; but he had the incisor in his head still, and he believed the nerve-pulp was perfectly sound.

Dr. FIELD said he could hardly agree with the author of the Paper, that every case of decomposed pulp would require six

months' treatment before it could be successfully filled. If carbolic acid acted so perfectly and thoroughly as they believed it did, and, indeed, as they knew it did, and if the root pulps were thoroughly removed with barbed excavators, and the antiseptic treatment were adopted thoroughly, he would hardly require six months for every case. Of course there were serious cases which might require six months, or even for ever, and they might go on using antiseptics with no result, except the ultimate loss of the tooth ; but there were other cases in which, with proper treatment, and the application once or twice perhaps of carbolic acid, the tooth might be safely filled. There might then be some of that sensitiveness which the author of the Paper had spoken of, and yet no remains of putrefied pulp. The sensitiveness might remain for a week, or ten days, or a fortnight in some cases ; but it would ultimately pass away, and the tooth would be preserved. Where there was a fistulous opening, and free passage for the antiseptics through the canals and through the opening, it might be safely filled the same day, if the operator knew where he was working in the roots, and the after-treatment might be applied through the fistulous opening. That, however, could not be done in every case. All practitioners knew that there were certain conditions in which the tooth could not be saved. They might apply all the antiseptics possible, and perform all the operations conceivable, and yet the operation would be ultimately a failure. Carbolic acid needed no supporters. Every day's experience proved its value. In fact, it was an invaluable agent. But in addition to that, there were other cases, obstinate ones, where salicylic acid might be advantageously used. The roots in these cases should be cleaned as perfectly as possible (the term "perfectly" was generally used, but it really meant as thoroughly as possible), and the salicylic acid employed in solution in ether or glycerine. As much as possible should be introduced into the roots upon cotton, carried well up, and then the tooth should be temporarily plugged. That might be left for a month, or three months, or six months ; and it would work its cure in many cases without any further tampering with it. It could then be removed, and the canals permanently filled.

Mr. UNDERWOOD said he understood Dr. Field to have alluded especially to cases of alveolar abscess, and in such cases he could bear out what had been stated ; the use, not of carbolic acid, but of creosote, had acted as a perfect charm where the operator could pump into the canal cavity, and thence into free communication with the sac, and until it oozed out externally through the sinus. They might plug, as he understood Dr. Field to say, then and there, with satisfactory results.

Mr. DENNANT said he imagined that the failures in the antiseptic treatment arose chiefly from two causes. First, in the case of anæmic patients, who gave them a great deal of trouble, and very often all the patience and care that was given to the case was utterly wasted. That fact should be taken into consideration before they commenced their treatment. Another source of failure was the want of courage on the part of practitioners in thoroughly opening up the pulp-cavity. They were all, in busy practice, apt to do things too hastily, and the want of freely opening the pulp-cavity was often the source of their failures.

Mr. STOCKEN said he recently had a case under his observation where a central incisor was discoloured, and tender to the touch. There was a fistulous opening corresponding with the apex of the fang, and the patient had been suffering for two years. He drilled through the back of the tooth and made a large opening, and found that the pulp was in a state of decomposition, and very fetid. He removed the whole of it, and passed a brooch through the apex of the fang. He then thoroughly syringed it with pure carbolic acid, dressed it with the same, and requested the patient to come to him again the following week, when he found the fistulous opening was closed. He gave it another dressing and syringed it, and at the end of a second week, when the patient returned and stated that all the tenderness was gone, he then plugged the tooth. That was now about two months ago, and the patient had had no inconvenience since. He had had another case in which there had been caries of a central incisor ; the patient had been suffering between one and two years with what she termed

constant gum-boils, and there was a fistulous opening. He treated that in the same way. That was four months ago, and the patient had had no tenderness or inconvenience whatever since.

Mr. SEWILL said he could hardly agree with Mr. Barrett in one remark he had made, as to the pathology of dental periostitis. He appeared to lay down as a broad rule that inflammation of the periodontum was invariably due to septic poisoning, arising from the formation of the gases which resulted from decomposition of the dental pulp. In his opinion, it arose from extension of inflammation, through continuity of structure from the pulp to the dental periosteum. As was lately demonstrated by Mr. Charles Tomes, the vessels to the pulp were those which principally supplied the dental periosteum also, and thus inflammation of that structure was more easily accounted for. He was not quite sure whether he understood Mr. Barrett correctly, that he used cotton wool and carbolic acid as a permanent fang-filling. If so, he wished to ask on what grounds, theoretically, that treatment could be satisfactorily based. Carbolic acid, no doubt, prevented putrefaction, but not longer than it remained in the structure; and if the roots were saturated with carbolic acid, the acid would not remain there for ever. Some years ago he himself treated teeth in that way, but he met with failures; he had had fewer failures since he had carried out the treatment which he had several times described at meetings of the Society; viz. clearing out the dead pulp, pumping into the roots absolute alcohol, and finally filling them with cotton and oxychloride of zinc, itself a strong antiseptic. One other point in Mr. Barrett's Paper he wished to remark upon, namely, with regard to the tenderness of teeth. Mr. Barrett had stated broadly that tenderness only appeared when decomposed matter was present; but there was another cause, and most practitioners were acquainted with it; viz. when it arose in consequence of external violence. From such a cause he had only a few days ago to extract a tooth, which he did with much reluctance. It was a perfectly sound tooth, with the exception of a small gold-filling; periostitis arose from a slight injury, and was not caused by any disease of the pulp.

Mr. COLEMAN said that, in speaking of the antiseptic treatment in regard to the teeth, it was desirable that they should, as much as possible, confine the term to cases analogous to those to which it had been applied by his esteemed connection the talented professor of surgery at Edinburgh : the application of carbolic acid to an exposed and discharging pulp, the capping and immediate filling over, was quite in accordance with what Professor Lister had laid down as antiseptic treatment ; but the purification of the fang canals of septic matter by means of antiseptics was not analogous. To the former then should be confined the term antiseptic treatment, although the latter was, of course, treatment by antiseptics. In some of the cases to which Mr. Barrett had alluded, and which had been noticed in the discussion, sufficient attention had not, he believed, been directed to the fact that, when a decomposed pulp had been removed, a putrid and offensive tooth remained ; and this, unless thoroughly purified, must be a constant source of irritation to surrounding structures ; and to this end he had found no agent so well adapted to the purpose as arsenious acid, although carbolic acid, absolute alcohol, and salicylic acid might often be successfully employed.

Mr. MOORE said a case came under his notice, a fortnight or three weeks since, which bore upon the observations just made by Mr. Coleman. It was that of a lady who had been suffering for some years from neuralgic affections, and was under medical treatment. After some time the medical man, on examining the mouth, found two of the upper molars in a carious state, and he recommended her to apply to a dentist. One of them he found was quite fit for plugging temporarily, and he filled it with the oxychloride filling. In the other tooth, the first molar, there was a large cavity in the distal surface, and on examining it he was persuaded that the whole of the dental pulp was entirely obliterated. He therefore merely treated it with carbolic acid and filled the tooth. The tooth was not at all tender, and the lady was perfectly satisfied, and he thought the case was done with. In about a fortnight or three weeks, however, she returned, suffering extremely ; so much so that she insisted upon having it extracted. After

extraction he found that periostitis had set up in the fangs, and suppuration would certainly very shortly have taken place. On splitting open the tooth and examining the cavity which had been filled, he found he was correct in the supposition that the whole of the dental pulp had been obliterated, but the dentine itself was in a state of putrefaction.

Mr. MOON said, as necrosis of the pulp due to the rupture of the vessels at the end of the roots had been mentioned, he wished to speak of a plan, which he had heard of from one of the dressers at the Dental Hospital and had since adopted, to find out when the pulp had lost its vitality, when there was no tenderness on pressure or discoloration of the surface. He applied a hot instrument to the contiguous teeth and to the tooth which was suspected, and if the tooth had lost its vitality, it was then readily ascertained by absence of sensitiveness.

Dr. FIELD said he should class among failures those teeth in which the dentine had become thoroughly impregnated with the suppurating matter. In such cases he suspected that the vascular membranes, as described by Mr. Charles Tomes, would have become so affected that there would be no longer any normal attachment between the tooth and the socket. Under such circumstances nature might tolerate the tooth for a long time, but it never could be cured. The antiseptic treatment, he considered, would not make that a successful case.

Mr. BARRETT, in reply, said, with reference to the pathology of periodontitis he advanced his views with diffidence, as he had only given attention to the subject for a few years. During that time, however, he had seen cases, made experiments, and formed opinions which he personally believed to be correct, though he would advocate them with considerable hesitation. He always regarded tenderness in a tooth as evidence of periodontitis. When there was tenderness upon pressure, he thought it was in consequence of the membranes around the fang being inflamed; and that inflammation he considered was nearly always the result of the escape of

particles of putrefied nerve from the opening at the extremity of the fangs ; those particles being forced out by gases generated during the process of decomposition. It was quite true that occasionally a tooth might be tender upon pressure from other causes. A patient might have a rheumatic diathesis, and there might be a tendency to inflammation in fibrous tissues situated in various parts of the body ; in which case the membranes lining the interior of the dental sockets might sympathize in the inflammation that was more or less affecting the white fibrous tissues all over the body. Occasionally, too, inflammation outside the tooth might be traumatic, resulting from a blow, or splitting of the tooth. Still he believed, in the vast majority of cases, perhaps in ninety per cent., inflammation outside the tooth was due to putrefaction within its pulp-cavity, and the escape of putrefactive particles from the extremity of the fang. The subject was one of considerable interest, and was still perhaps *sub judice*. Referring a few days ago to a standard manual, he noticed that the author considered periodontitis to be due rather to an extension of inflammation from the pulp to the tissues outside the tooth. It was possible that might be so ; but, as a matter of fact, he had always found, after extracting a tooth that had been tender on pressure, and which had shown signs of inflammation outside it, that the pulp was putrefied :—on splitting open the tooth, there was that very characteristic odour of decomposition which, once recognized, was never afterwards mistaken. If this were so, how could inflammation extend from the dead, putrefied pulp to living tissues outside the tooth ? Inflammation outside the tooth could be remedied by breaking down the walls of the pulp-cavity, and he gathered from that that the gas escaped into the mouth, and no longer forced putrefactive particles from the tooth through the openings at the fang ends. As to the question of the time required for the treatment of periodontitis, combined of course with a putrefied condition of the pulp, he said it might perhaps take three, or six, months, or longer even. The cases that required the greatest length of time were young teeth, six-year-old molars in children twelve years of age ; since there the pulp was large, and the opening at the extremity of the fangs also large, and the tooth contained

locked up within it a considerable mass of putrefied material. In patients fifty or sixty years old, the pulp was very small, and the opening at the extremity of the fangs almost closed, and therefore the amount of putrefied material shut up in the tooth was very much less than in the case of a child, and less time was required in the treatment. Probably, in such cases, after once clearing out the nerve, and well carbolizing the interior of the tooth, the permanent filling might be introduced with hope of good results. One or two antiseptic agents had been mentioned: carbolic acid, salicylic acid, and arsenious acid. He was not acquainted with salicylic acid, but arsenious acid was no doubt a very powerful antiseptic. It was used by the taxidermist, who had probably from long experience found out what was best calculated to preserve his skins. The fact that he used arsenious acid was no doubt strong evidence of its value. Still, he thought carbolic acid had advantages over arsenious acid. It was liquid, and penetrated readily into the fangs: running down to their extremities, and perhaps finding its way into the interior of the dentine. It was asserted by one speaker that the dentine itself might be decomposed. That seemed to him to be rather difficult, because dentine was composed of earthy salts and a gelatinous matrix, and he could hardly understand how a substance so composed could putrefy. He thought that when a mass of dentine was strongly fetid, the odour was due to there being putrefied nerve locked up in the tubules contained in the dentine. He had been asked whether he would counsel leaving carbolic acid and wool in the fangs and pulp-cavity. To that he answered, Yes. The object was to carbolize the interior of the pulp and fangs as thoroughly as possible. In order to do that he would convey in a large quantity of carbolic acid—soaking a small plug of wool in the acid, introducing it into the pulp-cavity, and ramming it home. In that way he insured thorough impregnation of the tooth with the antiseptic. He would mop out any superfluous carbolic acid that might be hanging about the neck of the tooth, and dry out the cavity as thoroughly as possible. He would then put in his permanent stopping, and leave the tooth. Carbolic acid introduced in that way, and confined by an outer permanent stopping, would probably not escape, and if, twenty

years after, the tooth so treated were extracted and cut open, the interior of the tooth would probably be still strongly odorous of the carbolic acid ; proving that it had not been dissipated. Of course that was only a supposition. It was remarked by Mr. Coleman that Professor Lister advocated the application of the antiseptic treatment only to unhealthy surfaces, abscesses, necrosed bone, &c. ; but five or six years ago, when the treatment was being carried out at various hospitals, he remembered applying it himself and seeing it applied to recent amputations, where the surface was not unhealthy. One particular case he recollected, where a fatty tumour was removed from the breast, and the raw surface was treated with carbolic acid ; the result being a primary union, without production of any particular amount of pus.

The PRESIDENT said all present would agree with him in returning thanks to Mr. Barrett for his Paper, which had been thoroughly successful in eliciting a very interesting discussion. All discussions on that subject were of peculiar interest to himself, for he was appalled at the enormous number of extractions that were performed at the Dental Hospital. When he heard gentlemen explain their modes of treatment, and the great success which many of them attained, he was a little ashamed of himself, for he was not so successful. He hoped the time would come when the number of extractions at the Hospital would be considerably reduced.

The thanks of the meeting were then accorded to Mr. Barrett, to the donors to the Library, and to the gentlemen who had made Casual Communications.

The meeting then adjourned to June 12th, the first Monday in June being a Bank-holiday.

GENERAL MONTHLY MEETING.

June 12th, 1876.

CHARLES VASEY, Esq., PRESIDENT, IN THE CHAIR.

THE Minutes of the last Meeting were read and confirmed.

The following gentlemen were nominated for membership :—

Sir JAMES PAGET, Bart., D.C.L, F.R.S., President R.C.S., &c., honorary.

Mr. W. SCOVILL SAVORY, F.R.S., F.R.C.S., &c., honorary.

Dr. KARL WEDL, Professor of Pathology, Vienna, honorary.

The following were elected members :—

Mr. GILBERT MALLET, Old Rectory, Newbury, Berks, non-resident.

Mr. HARRY BEADNELL GILL, L.D.S., 62, Bow Road, resident.

Mr. J. H. WATFORD, L.D.S., having signed the obligation-book, was formally admitted a Member of the Society.

The PRESIDENT announced that Mr. Moon had presented to the Library two volumes of the last edition of Mr. Bryant's "Practice of Surgery."

The PRESIDENT said he regretted to announce that Dr. Murie, owing to extreme pressure of business, would be unable that evening to read his paper, but they would be sure to have it next session. He hoped the evening would be profitably spent in hearing and discussing casual communications.

Mr. WEISS called attention to a case of deposition of tartar on the buccal side of a block. In extent it was about $1\frac{1}{4}$ inch in length and $\frac{5}{8}$ inch in thickness. What made it interesting and remarkable was the clear indications on the grinding surface of the block that that side of the mouth had been freely used for mastication. Again, what made it still further remarkable was that a foreign body in the mouth would cause disfigurement of the face, the cheek being thrust out, without the patient being aware of it. On the other side of the mouth there was little or no deposit, nor to any extent on the lower jaw. There was another little matter he would bring before the notice of the Society. Some time ago he paid more than ordinary attention to the construction of vulcanite pieces, and in doing so reviewed most of the apparatus that were so employed. About seven and a half years ago, being very dissatisfied with the flasks then generally employed, he constructed one, and, although in its parts it might not possess any individual novelty, it was, in his opinion, a combination of all the better parts of other flasks. The flask he exhibited had been vulcanized with over 1,400 times, and had been in constant use for seven years. In the construction of vulcanite pieces there was a lower and an upper part to the flask. When the lower was in its proper position, it was essentially necessary that the upper half of the flask should be directed perpendicularly on to it. The flasks that were in use at the period he referred to had little to indicate that the flask was, when screwed down at all, in its place; in the one he exhibited there was a shaft and a rod on each side, and the upper one went down readily, steadily, and perfectly perpendicular. He had heard it remarked that teeth were broken in the closing of the flask. That arose from the two halves not going into a true position. In all pieces of mechanism there was that which was destructible, and that which was indestructible. In the box itself, in which the piece had to be vulcanized, there was little or no destructibility, but it arose in those portions in which its pieces were held together. These, as he had constructed them, were simple clamps, with wedges, and could be renewed at a very trifling cost.

Dr. SANGER said that the case mentioned by Mr. Weiss reminded him of one many years ago,—a woman, sixty years of age, who was subject to rheumatic gout, and who had concretions considerably larger than that mentioned, round the teeth of the lower jaw. Whether the rheumatic gout diathesis had anything to do with those concretions he did not know, but he should imagine it had. He supposed it was from the salivary glands that the concretions were formed inside the mouth : the salivary glands exuded a fluid something like the gouty concretion formed in the joints. He remembered once seeing a formation of the same kind in one of the sub-lingual glands, which he opened and liberated.

Mr. STOCKING said he had the case of a patient who told him that a concretion passed through the sub-lingual gland every third year. It was about half an inch in length, and three-eighths in width. There was a little swelling under the tongue, and in course of time the calculus escaped into the mouth. He (the patient) had several of them at home, and the next one that passed into the mouth he had promised to give to him, that he might inspect it, and give full particulars relative to it.

The PRESIDENT remembered the case of a poor woman who had a very large mass of tartar formed in her mouth, about the same size as described, which formed over a molar tooth, and was supposed by the patient and her friends to be an out-growth of bone, and she came to the Hospital to have the, supposed, exostosis treated.

Mr. SEWILL thought that there might be some relation between the deposition of tartar and rheumatic gout diathesis; but it could hardly be that indicated by Dr. Sanger. He thought that gouty concretions of any kind were not analogous to salivary deposit. The tartar was more akin to the concretions of the bladder, which fastened round a foreign body. So in the mouth, the deposit took place on the teeth. In patients of gouty diathesis no doubt there was often a large amount of tartar found; and, in fact, in all cases where there was dyspepsia, or a vitiated state of secretion. Patients with gouty or

rheumatic diathesis had chronic inflammation of the gums and vitiated secretion of the mouth, which tended to larger formation of tartar, and for the reasons that the teeth were kept rough by the saliva being viscid, and particles naturally accumulating round the teeth, so that the earthy matter was more readily deposited. Tartar, besides being made of earthy matter, contained foreign particles, such as epithelium-scales, and other matters found in the mouth.

Mr. TURNER said the case brought forward by Mr. Weiss had this remarkable feature, that it was attached to the smooth surface of a bone side block which was more or less polished, and which bore indubitable marks of having been freely used. Many cases of accumulation of tartar had been met with, but mostly when the patient had lost the opposing teeth. Mr. Weiss's case showed that the side block had been severely used, and also that the piece had been well adapted to its work. It was very strange to see how the tartar, which was deposited in a soft state, could make room for itself. This occurred not only in cases like those shown by Mr. Weiss, where the teeth had been discharging their proper function, but in other cases where the teeth had not been doing their work properly. If such a mass, in a soft state, were put into the mouth against the buccinator muscle, the muscular pressure would very soon dissipate it ; but in the case of salivary calculus, it accumulated so very gradually, that it literally asserted its power over the tone of the buccinator muscle, and drove the muscle before it, to the distortion seen. It was a remarkable instance of how gradually-applied pressure in a soft material overcame harder and stronger pressure. Mr. Weiss had exhibited a very interesting specimen of a vulcanite flask. There was no one in the room who pretended to be a dentist who could be other than much interested in all matters which tended to facilitate the execution of mechanical dentistry, and he thought they were greatly indebted to Mr. Weiss for bringing the flask forward. He had claimed for it durability, because there were no screws. That would be at once conceded. He had claimed for it a direct action, an arrangement by which the two halves of the flask could be brought together, in the way

in which it was desired to bring them together, without any shifting or misdirection. That showed that Mr. Weiss was striving after something he did not quite attain. It was a method of keeping the teeth which he wished to set upon the mould, and the mould itself, in a certain relative position, or in juxtaposition to each other. It seemed to him (Mr. Turner) that the better way would be never to separate them at all. A flask which would enable the operator to hold the teeth and the model in the same position, before he commenced to pack in the rubber would be most valuable ; and that was the kind of flask that had been offered by Mr. Brunton to the profession about two years since as the contour flask. Messrs. Ash had told him that they could not sell those flasks at all. He could not but express his astonishment that anybody seeing those flasks should hesitate for a moment to say that they were not the very best flasks that were introduced to the profession. The flask opened in the rear ; the upper and lower parts of the work were firmly wedged together, and then the operator commenced to pack, and the wedge or plug was screwed in from behind, and there was obtained a pressure exactly in the direction in which it was wanted, and it was not necessary to move either the model or the teeth ; they were firmly bound together by an iron band or wedge, while the plug was being screwed home. That, as far as he knew, was perfection in a flask, and he had never seen any room for improvement in it, and would not desire a better flask. Although it was awkward to work with at first, he was sure that those who worked it would say that it was simplicity itself after one or two trials.

The PRESIDENT said he should like to ask Mr. Turner whether, having had experience of the contour flask, he was able to pack with facility the gum-coloured rubber around or between the teeth, and then to fill up with the other material.

Mr. TURNER replied that there was no difficulty whatever.

Mr. LYONS said he had a case of the four upper permanent incisors becoming loose occurring in a lady twenty-two years of

age. The alveolus had disappeared. It was not an uncommon case, except as regarded the age of the patient and the amount of absorption which had occurred to all of the four fangs. The disease had been three years in duration.

Mr. CANTON said he had two cases, the notes of which he had hurriedly written down, which might be of interest to the Society. The first was that of a young lady, who, at the age of twenty-one, had a severe fall during an attack of scarlatina. One front tooth, she distinctly stated, was loose before she had the fall; but four years after this two other front teeth had become so loose that the three were extracted and put on to a gold plate. Last July (six years since the upper front teeth were extracted) the four lower incisors had to be removed on account of the same, and also the right lower first molar, on account of decay of the posterior fang, apparently from pressure of the second molar. This tooth was very loose as well. This brought the lady to the age of thirty-one years, and wearing three upper and five lower artificial teeth. He might mention that she was the daughter of a medical man, and one of a very large family; that no other members had suffered in the same way; and that her father could in no way account for it, as she had always been a very healthy person, and had had no illness whatever except the scarlatina mentioned. Her gums were, to all appearance, perfectly healthy, but rapidly receding from the teeth, and the fangs of nearly every tooth were quite exposed, and all the teeth more or less loose. He saw this patient on the 17th of last month (May), when she came to him on account of the left upper first bicuspid having dropped out, and which he added to the plate she already wore. He had brought with him the four lower incisors, which he would pass round; they were, to all appearances, perfectly healthy, and every other tooth was so also, except the molar extracted, and which he had accounted for by pressure. The second case, very similar, was as follows. The notes of it were by the patient herself:—“When first I noticed my teeth getting loose, it was about the year 1870. Three years after that I went to a dentist, who scraped them. I tried several things to fasten them, but all to no purpose. My gums used to be very full, and a dark red,

also to swell sometimes. I was subject to gum-boil. For years I noticed a thick matter on the teeth. About two years ago the discharge from the gums became more, but not so thick. Now it is all about my mouth in the morning; before it was confined to the teeth only. I never had a serious illness in my life, and always have had good health, with the exception of colds, headaches, and a very low, nervous feeling. My age is twenty-six; I cannot in any way account for my teeth becoming loose." He saw this patient for the first time on August 9th last year, and then extracted the two upper central and one lateral incisor, which were perfectly loose, as was every other tooth in her mouth, and in similar condition to the first case; viz., gums very much receded, roots all exposed, and teeth all more or less loose, especially one lower incisor. He saw no signs of any discharge from the gums, which appeared quite healthy; he could get no history of a fall, or a blow, or illness, or, in fact, anything to account for the state of her mouth. He had the extracted teeth with him, and would pass them round. These two cases he had brought before the Society as having a great similarity between them, and because he should very much like opinions of the members upon them; they were interesting as occurring at so early an age.

Mr. SEWILL said he had had a case of entire absorption of the root of a permanent tooth, and which he had had the opportunity of watching for seven or eight years. The tooth became gradually looser, until it was removed by the finger-nail. There was a history of injury which had occurred many years previously. The case being somewhat *à propos* to those just described, he now exhibited it. When a tooth was partly dislocated, it never entirely recovered its attachment to the jaw, and there was continuing chronic periostitis and absorption of the root of the tooth, and at the same time absorption of alveolus. There were other cases, however, which appeared to be quite unaccounted for, as described by Mr. Tomes and other writers. He had several patients under his care at present about the ages of those of Mr. Lyons and Mr. Canton; and they were losing their teeth in the way that had been described, the alveoli being slowly absorbed; and from time to

time they came with the teeth so loose that they had to be removed, and an artificial piece substituted. In some of these cases, the general health might be suspected; but in most of them there was very little history to account for the local disease. With regard to treatment, he might remark that the wearing of a piece of artificial dentistry, made on a certain plan, was of very great service and comfort to the patient. The plan he adopted was, to take the best model he could get, using liquid plaster of Paris, and making a vulcanite frame to extend round all the teeth, and to keep the bite from loose teeth. It protected the loose teeth from the bite and from change of temperature.

Mr. HUTCHINSON said that three months ago he had a case in which, without any apparent cause, loosening of the whole of the teeth in the upper and lower jaws occurred. The loosest of them was the left upper central, which he removed and replaced by an artificial tooth. The gums were tumefied, red, and inflamed, and round the necks of all the teeth there was a deposition of that peculiarly hard and scaly tartar which was commonly found on teeth that became loose by such deposit. He should be glad to hear that any member coincided with the opinion that tartar of this description was most frequently deposited on teeth wide at the cutting edge and very narrow at the neck, leaving spaces between the necks of the teeth, and favouring the deposit of food and irritating matters, more especially of tooth-powders forced in by the action of the tooth-brush, and creeping up insidiously between the gum and the tooth and causing absorption of the alveoli. In the particular case which he had three months ago, every tooth in the head was loose, and there was every prospect of the patient losing them all one by one. There seemed to be no palliative measure beyond moving the tartar, where that could be done.

Mr. OAKLEY COLES said he had a case of a girl twenty-three years of age, a worker in artificial wax-flowers. The gums were very much inflamed at the margins, and the teeth were loose; and he was under the impression that they were very

wide at the cutting edge, and of the shape mentioned by Mr. Hutchinson. The tartar was of a dark colour, exceedingly hard, and passed at some distance from the neck of the tooth towards the alveolar cavity. In that case he removed as much of the tartar as he possibly could, holding the teeth firm with the thumb and finger and using a fine scaling instrument up the fang of the tooth. He then scarified the gums, especially the margins, in all directions, after which he applied to them chlorate of potash ground up in glycerine. In these cases he relied very much upon the use of chlorate of potash alone, because it was sufficiently gritty to clean the teeth and the gums; and then it became thoroughly dissolved, so that there was no foreign deposit afterwards. A large amount of it was absorbed into the gums and passed round into the inner surface of the gum as it connected itself with the teeth. He found that that case was as successful as any. None of the teeth were lost, and the girl got better. Whether the cause of this condition was connected with her occupation or not he could not say; there was no history of syphilis, and the girl was strong in every other respect.

Mr. C. S. TOMES said he had certain models that had been sent by Dr. Moffat, of Edinburgh, which were interesting as showing how a very unpromising-looking mouth had been brought into a tolerably satisfactory form by the extraction of a tooth, and by the patient learning to put a pretty constant pressure on one of the teeth at the neck. One of the central incisors was of great size and looked like a geminated tooth; but the lateral incisor and a bicuspid were extracted, and space having thus been given, the patient, by using her finger, brought it into a fairly satisfactory position.

Mr. SEWILL said he had some models bearing on Mr. Tomes's case, and showing how a dentist might get undeservedly credit for his appliances. Some months ago the teeth of a young lady, fourteen years of age, were broken into fragments by a blow from a stone. It was necessary to extract the front teeth, and then came the question of putting in artificial teeth, or closing up the gap in front by pressing the teeth together.

The canine on the right side passed inside the lower tooth on the closure of the mouth. The incisors were prominent beyond the lower teeth when closed, and the left canine was also prominent. The mouth was very badly adapted for artificial teeth, and he thought it better to close the gap in front by pressing the teeth together. A plate was prepared and pressed into the teeth, and the patient was sent into the country under the care of a dental practitioner for some months. After the lapse of a few months she came up, and he found that she had only worn the plate for a short time. The canine was still locked in by the bite. The front teeth were not fully closed in, but the canine on the left side had fallen in considerably, and there was very little deformity in the front of the mouth. He could not induce the patient to wear the plate continuously. The improvement was so great that the friends thought it unnecessary for her to wear the plate.

The PRESIDENT said that he had a model of a case of cleft palate in which the incisor tooth was not only turned round but bent upwards to a horizontal position, standing out in a very awkward and frightful-looking manner. Such cases in the present day were generally treated at a very early age, but this woman was over thirty, and even the harelip had not been operated on. There was a point of some interest in these cases of cleft palate. They were supposed to originate through the non-union of the intermaxillary with the maxillary bones, the former containing the central and the lateral incisor teeth. But this was a case with a supernumerary tooth, and the lateral incisor on the wrong side of the gap to what it should be if the gap depended on non-union of the intermaxillary bone with the two maxillary bones. The division generally seemed to be between the lateral and central incisors.

Mr. OAKLEY COLES said the President's model of congenital cleft palate illustrated a point he had been looking for evidence for for some time past, and that was the influence of the operation for harelip performed in early life as compared with the relative position of the jaws at an adult age. He had never before seen the model of the mouth of a patient thirty years

old, and so afflicted, in which there was anything approaching perfect articulation in the upper and lower teeth. It was invariably found that the contraction that followed the union of the two margins of the united lip, when the two maxillary bones were brought within the range of the lower jaw, was such that, for all purposes of mastication they were practically useless ; whereas in this case the teeth were found in their perfect, relative position. He would not have ventured to make any comment upon this, but that he wished to draw the attention of surgeons to the fact, that they might consider whether it were possible to postpone to a later period the operation for harelip. In many cases it might be impossible to do so, but where it could be postponed for a time it would be very desirable, as it would preserve the relative position of the upper and lower jaw much more perfectly than if the operation were done earlier in life, and would make a much more symmetrical arch for operation, or for the application of an artificial palate later on in life. In the case before them the two margins of the cleft were on nearly the same plane. If an ordinary congenital harelip which had been operated upon were examined, it would be found that one-half of the jaw was on a different plane from the other, and the side that invariably articulated with the vomer was on a higher plane than the other side, simply because the vomer kept it in position, and the other half of the jaw, being deprived of any attachment to its fellow, was driven in, and brought on the lower plane by a contraction that followed the union with the harelip. This made an unsymmetrical mouth in adult life, and interfered with the regularity of the teeth, and with speech. He did not know how far it had been observed by others, that if the vomer articulated with one side of the maxilla ; it was invariably on the right side, which happened in every case he had seen. Why that should be, he was quite at a loss to determine ; he could only state it as a fact. He thought that the intermaxillary bone should, in these cases, be used as far as possible as a wedge, and driven in, instead of being removed to get easy approximation of the lips in order to keep the two halves of the jaw apart.

The PRESIDENT said he was afraid that deferring the opera-

tion of uniting the lip became so serious in the matter of articulation that very few in the present day would consent to its being deferred. The difficulty, too, in feeding a young child made it very desirable indeed to have the lip united as early as possible.

Mr. C. S. TOMES.—In examining the heads of some common English vipers, he found there was an arrangement in the development and succession of the teeth which was quite unique. The poison-fang of the viper, or of any viperine snake, was the sole remaining tooth of the whole row of teeth on the maxillary bone, there being in the harmless snakes about a dozen teeth on the maxillary bone. Then there were some poisonous snakes which were transitional in character, and had a large poison-fang at the front of the maxillary bone, and some smaller ones behind it. The typical viperine poisonous snake had one very long poison-tooth on the maxillary bone. All the others had wholly disappeared, and the maxillary bone was much shortened. The tooth was of very large size. For these snakes to close their mouths it was necessary that the teeth should be movable, and should be laid down ; whereas in poisonous snakes, such as the Indian cobra colubrine, where the poison-fang is small, it was immovable and always erect. In the typical poisonous snake the fang was very large, and from the habit of the creature was very liable to be lost. A poisonous snake strikes at living animals, which may jump away, and the fang, buried deep into its body, be broken off. The poisonous snake was entirely dependent upon its poison-fangs for getting food, and the loss of its poison-fang for any length of time would be a serious matter for it. That difficulty was met in the viperine snake by the very curious arrangement to be described. There was room on the maxillary bone for two poison-fangs side by side ; but the snake at any one time had only one. If at the present moment it had a tooth on the extreme right-hand side of its maxillary bone, it had a tooth getting ready for the place on the left-hand side ; and so successive teeth went on alternating on the two sides of the bone. Not only did the teeth occupy positions alternately on the right and left side of the bone, but there were two complete chains of

young developing poison-fangs, one chain on the right hand, and one on the left ; these two complete series of developing organs being intended for the purpose of keeping one always ready for use, so as to reduce to a minimum the loss of time. The peculiarity of the whole matter was, that there were two complete series of developing organs devoted to the purpose of keeping one organ in an active functional condition. There were ten or twelve poison-fangs forming at one time, of course in different stages. This peculiar arrangement of a double series of developing teeth did not exist in transitional poisonous snakes like the cobra ; and that was very probably the reason why the Indian snake-charmer preferred a cobra to any other poisonous snake that existed in India. If the cobra were disarmed, the next poisonous fang had to come from the same series, and had to be fixed in pretty much the same position as the one which had been pulled away ; whereas, if the viperine snake were disarmed, the interval during which the snake would remain harmless would be very much shorter. There was one other little point which was also of interest. It was well known that the duct through which the poison went down in the poison-fang was nothing but a groove on the outside of the tooth, so that the surface lining the groove was the same as the outside surface of the tooth. In the transitional forms of poisonous snake a thin coat of enamel covered the outside and inside of the tube ; but in the typical viperine snakes, in which the enclosure of the groove was more complete, the enamel was solely on the outside of the tooth, and none lined the tube. On a very young tooth the large cells of the enamel organ ran round the inside of the groove, near to the tip of the tooth ; but when it got lower down, the large cells of the enamel organ did not pass further than was shown in the diagram. In that part which would become the interior of the tube, their place was taken by a stellate tissue, like that which made up the bulk of a mammalian enamel organ. This stellate tissue was not of much importance in the formation of enamel, but in the viper the stellate tissue looked as if it were nothing but a retrograde metamorphosis of more active cells. The typical poison-fang had another peculiarity not described in text-books ; that is, it had dentine prolonged to an exceedingly fine point, and

on this there was a wonderfully thin coating of enamel, some $\frac{1}{8000}$ th or $\frac{1}{12000}$ th of an inch in thickness. The tooth of a poisonous snake was used violently ; so that if there was a long, slender point of enamel, it would be constantly broken off. By the structure mentioned, elasticity was combined with sharpness.

Mr. COLEMAN, in reference to the remarks made by Mr. Tomes, said he was personally interested in knowing whether the Egyptian cobra was the same as the Indian cobra. Mr. Tomes said that it was ; and he would also ask Mr. Tomes the question how soon one fang would succeed another. He had a great idea of bringing from Egypt last year two cobras, the poison-fangs of which had been removed. Under these circumstances they had to be fed by hand with eggs and milk. It would have been rather awkward if the fang grew rapidly ; and if during the process of feeding he had received a wound, he probably would not have been present to ask the question of Mr. Tomes.

The PRESIDENT asked Mr. Tomes if he had seen any examples of a viper in which the tooth had not been lost and the following tooth come forward, or was the development of the second one in abeyance until the first was lost ?

Mr. TOMES said he believed it took place with perfect regularity. This was almost proved by the fact that the teeth in these two series were in pairs of almost equal age, in which each had arrived at almost the same stage of development. If any long interval elapsed between the replacement of one by the next, a more distinct difference in the stage of development might have been expected.

Mr. TURNER said he should like to ask Mr. Tomes, in reference to the shedding of the teeth in the viper, if he had been able to ascertain whether the teeth were shed alternately. Supposing the tooth had been exposed to an accident, would it be shed on the one side before the succeeding tooth manifested itself on the other ?

Mr. TOMES said he did not know how that might be ; but

the keeper of the Zoological Gardens informed him that the shedding of that tooth took place very frequently, and that he picked up many shed poison-fangs in the cages in which the vipers were kept, and they very often swallowed their own shed poison-fangs which were imbedded in their prey. The keeper was not able, however, to give any precise details as to the process of shedding or the rate at which they were shed. He had asked him, however, to observe this as far as he could, and he hoped to be able to get further information on the subject.

Mr. GADDES said he should like to ask Mr. Tomes if the germs were developed on the preceding teeth, as was the case with the teeth of reptiles generally.

Mr. TOMES said there was no peculiarity in the development of the germs whatever, excepting what might be termed their accidental position. They were kept in a sort of capsule, as represented in the diagram ; but, otherwise, the very young germ of a poison-fang was quite undistinguishable from that of an early tooth, and was derived from that of a next older one. The early germs, corresponding only to the top of the tooth, were in no respect peculiar.

The PRESIDENT conveyed the thanks of the Society to Mr. Moon for his donation, and to the gentlemen who had made casual communications. The Society was adjourned till the first Monday in November.

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